The United States MILLER

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Facts Worth Remembering

Millers who desire to avoid troublesome litigation, will do well to remember the following facts:

That **Gray's Patent Noiseless Roller Mill,** of which we are the sole manufacturers, was **the First Positive Drive Belted Roller Mill** invented and placed upon the market in this country or Europe.

That the construction of these Celebrated Roller Mills **is Fully Covered by the Foundation Patents** issued to W. D. Gray, and of which we have sole control. These patents are Nos. 222,895; 228,525; 235,761; 238,677; 251,217; dated December 23d, 1879; June 8th, 1880; December 21st, 1880; March 8th, 1881; December 20th, 1881. From the dates it will be seen that these patents **are the earliest** ones issued for improvements in Roller Mills, and a careful investigation will convince any miller that **they cover every feature of value** in a belted Roller Mill

That several belted Roller Mills lately put upon the market by other manufacturers are simply imitations of **Gray's Patent Noiseless Roller Mills,** imitations in every way inferior to the original, in merit and design, and **Palpable Infringements** of our patents.

That we are fully **determined to Protect our Rights,** and have taken action to begin suits against infringers. While we regret the necessity of this step, it has been forced upon us by the unscrupulous conduct of other manufacturers.

We are thus explicit, in order that millers may have fair warning, and that they need not, by **Purchasing Infringing Machines,** involve themselves in **Troublesome and Expensive Litigation,** which must eventually result adversely to them. We have no disposition to deal harshly or unjustly, and only ask for a fair and candid investigation of our claims. Millers who are using Roller Mills which infringe our patents and who wish to avoid trouble by settling with us before incurring the expense of a suit, will be liberally dealt with, as it is not our design to oppress millers, but rather to force infringers to respect our rights.

Gray's Patent Noiseless Roller Mills

Are fully protected by foundation patents; they infringe no other patents, and they are the **Best** and **Most Successful** Roller Mills in the market, there being more of them in use than of all other makes together. **Millers Run no Risk** in buying these Machines, and in purchasing of us will get the **Best Machine,** without any expensive accompaniments in the shape of suits for infringements.

EDW. P. ALLIS & CO.,

Sole Manufacturers of Gray's Patent Noiseless Roller Mills,

MILWAUKEE, WIS.

[Mention this Paper when you write to us.]

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What Sam. Chisholm has to say about Milling.

No cereal is so intimately associated with the history of civilisation as wheat. At the very dawn of historical times the plant is found in cultivation in the far eastern lands and the berry itself held in the highest esteem as food. It is a noteworthy fact that all nations of the world that have distinguished themselves as intellectually great and progressive have been large consumers of wheat. The extent to which races have consumed wheat may be taken as a measure of their civilisation. In Egypt, Greece and Rome, the three lights of antiquiti, wheat was the chief staple of consumption. The island of Sicily and the countries around the Black Sea were partial sources of supply to Rome and Athens, and the expenditure of treasure and blood in order to obtain and hold possession of these provinces never lacked for justification in the eyes of the people, for the wheat supply then was of as much importance as it is now in modern Europe. What is true of the anicent world is true of the world of to-day. A brief review of the peoples of the globe will demonstrate that the wheat-eating nations are the strong and mighty nations. Compare, if you please, the wheat-eating races of Great Britain, France, and the United States with the rice-eating inhabitants of India and China. Of course such a comparison does not prove that the consumption of wheat is productive of civilisation, but it does show conclusively that the higher the type of civilisation the greater the estimation with which wheat is regarded as a food staple. We may very properly pass without consideration the much discussed question where wheat originated; suffice it to say that we are told the Chinese records speak of its cultivation in the Flowery Kingdom 2,700 years B.C., and it was certainly known to the Egyptains 4,000 years ago.

An enumeration of the different varieties or kinds of wheat would be almost impossible. One French experimenter, I believe, succeeded in producing over 300 varieties. For general purposes the subdivisions into winter and spring wheat, coupled with the attributes "hard" and "soft," are sufficiently definite for our purpose.

A grain of wheat is not a seed, as might be supposed at first sight, but a fruit, perfect in itself and bearing within itself its own seed, which is the germ. Beginning on the outside of the wheat berry, we find first three fruit coats, which are known as the first, second, and third fruit coats. Next comes two seed coats, which are called the first and second seed coats. These five coatings altogether have a thickness of abouth one-four-hundredth part of an inch. Next comes a single coat or layer as thick as the outer five together, surrounding the interior portion of the berry and containing nitrogenous substances (gluten) technically called *perisperm*. The interior portion of the berry comes next, consisting principally of starch, &c., *endosperm*, and lastly, the germ or embryo at the base of the kernel.

What is known as "bran" in milling, comprises the first six of these layers, and to free these and the germ from the *perisperm* and *endosperm* is the aim of scientific milling. From the standpoint of the scientist, the *perisperm*, or the single layer of gluten cells which lies directly inside the bran, is the most valuable part of the wheat, and the flour will be stronger or weaker as it contains more or less of this layer of gluten cells. "Well cleaned bran" is therefore not only desirable from an economic point of view, but also from motives of giving strength and nutritious element to the flour. One point in the construction of the wheat berry which should be remarked here, and which contains a hint towards the best methods of reducing the wheat, is that the cells of the bran coatings have their gratest length with that of the berry, and that the gluten and starch cells are disposed in such a manner that they are least disturbed by breaking the kernel lengthwise, and are disintegrated most easily by breaking at an angle to the crease. This disposition of the cells of the bran, and those of the interior of the wheat grain, points out a rational method of procedure in separating the flour particles from the bran and germ, to which I shall allude further on.

Essentially the constituents of the wheat berry may be said to be gluten, starch, water, and woody fibre. It need hardly be remarked here that wheat or flour is more valuable just in proportion to the quantity of gluten it contains. In some varieties of wheat the gluten is more elastic, as well as more abundant than in others. The germ consists principally of oil and starch, and the best scientists as well as the best millers, are now agreed that it should have no place in the flour, as its yellowish cast not only discolors the flour, but the oil it contains is a hindrance to bread-making. To this, however, I will call your attention in another connection,

The relative proportion in which the constituents above mentioned are contained in wheat varies greatly with locality, season, weather, &c. Wheat ordinarily contains from 12 to 15 per cent. of water. The proportion of gluten varies even more greatly, running as low as 7½ per cent. in some wheats, and as high as 22 per cent, in others. Hard wheats have uniformly more gluten than soft wheats. Damaged wheat contains less gluten than that in a sound condition, and the gluten is generally of a less elastic nature. We might also remark that wheat grown on new soil generally has more gluten than that grown on exhausted soils. Owing to the fact that it is not possible to separate the *perisperm* entirely from the bran, "straight flour, contains usually a larger proportion of starch compared with the gluten than would be shown by an analysis of the wheat from which it was made. Having briefly examined the raw material with which the miller has to deal, we will pass on to note some of the

Systems of Reduction.

Milling at the present time presents so many complex and varied forms, that anything more than general classification of the systems now used would be tedious as well as profitless. For all practical purposes we may reduce the various processes, so far as the reduction of the wheat is concerned, to four systems of milling. 1st, Low or Flat Milling; 2nd, New Process Milling; 3rd, Half-High Grinding; and 4th, Gradual reduction Milling. By low or flat grinding is understood the old style of milling, in which the wheat is sent to the millstones, ground close, and the chop bolted; in short, the system universally followed in most countries up to within a dozen years, and still largely in vogue in this country, France, and many parts of America, particularly in custom mills. New Process Milling consists in grinding high with burrs, so as to make as much semolina or middlings as possible, and as little flour; separating the middlings and flour thus made, purifying the middlings and regrinding them; bolting this product, and so obtaining "patent" or "new process" flour. Half-High-Grinding may be described as a modification of the new process by the introduction of other steps, such as splitting the wheat, then grinding very high, regrinding the bran, breaking down the coarse middlings, &c. Half-High Milling is therefore a rather elastic and convenient designation of the process of milling, intermediate between the New Process and Gradual Reduction. This last and, to this country and America, newest system consists, as the name implies, in a systematic reduction of the wheat berry into smaller particles, the operations by which this is effected being attended with various and systematic separations of the products (flour, middlings, bran, &c.,) the purification of the middlings, and the final reduction of the middlings to flour, &c. The number of reductions employed may vary greatly according as the system is more or less elaborated, and also according to the means employed. In the reduction of wheat proper, from five to seven reductions are generally employed. though with the Jonathan Mills machines the first two reductions are hardly such, but are more properly wheat-cleaning operations.

While this classification of systems may seem more or less arbitrary, and merely groups together differences, in practice you will observe that a progressive elaboration has been going on by which the simple milling of a few years ago has become transformed into the more complex process of the present day. The change in America, however, has been gradual. American millers have not jumped from one reduction to ten or twelve; experience and economic necessities have led to one modification and another, until, to-day Gradual Reduction is pre-eminently the American system of milling. It is the scientific and practical aspect of this system to which I shall direct your attention. As I have just stated, Gradual Reduction Milling was, and is, a development, a growth in America. It was not an importation from abroad nor a sudden revolution at home. If you will but trace the steps which the scientific, commercial, and practical views of milling have gradually compelled millers to take, you will have the best practical knowledge of what the true principles of gradual reduction are; and this knowledge will be of great assistance to you in determining the all important question, viz., what machines are best for this purpose? Let me be fully understood. What I intend to convey is that a careful consideration of all the requirements of milling at the present time—scientific, commercial, and practical—will form the best data for judging of the merits of the different systems of Gradual Reduction Milling. In other words, let your reasoning be from the requirements of milling to the system, and not endeavor to make the necessities of milling fit some preconceived system. It is certainly a rational method first to find out what we want to do and then examine the means and appliances which are offered for accomplishing it, instead of selecting machinery haphazard and then attempting to discover what we can do with it. The first method has the merit of being not only the most logical, but the least expensive also.

Development of Gradual Reduction.

It would be most interesting, if our limited time would permit, to trace the gradual development of the art. Gradual Reduction is a system that has been forced upon millers rather than reasoned out by them. Men have not sat serenely down and made all this improvement by a simple process of reasoning. The first step of progress has been taken as a rule, first from necessity, and once taken other improvements have suggested themselves, or else forced themselves to be adopted.

History does not go back so far but that we find men employing some means of reducing wheat to meal flour. Even in the time of Abraham wheat was reduced to meal before being eaten, and from the passage where the visit of the strangers is recounted, it is evident that there were at least two ways of preparing the wheat for use, showing that even at that early date some improvement over the universal primitive fashion of pounding the grain in a mortar had been made.

It is hardly necessary, in this connection, to mention in detail all the various means which have been employed by mankind in different ages of the world, and in diverse stages of civilisation. The whole history o early milling may be summed up by stating that for ages the pestle and mortar, the quern and the conical millstones, formed the means of reducing wheat. The chief point to be noticed, and one form which an important fact may be learned is, that even in the earliest times men sought to separate the bran entirely and obtain as white a flour as possible. The Romans and the Greeks must have attained to some considerable perfection in this matter, for it is certain that they had the means of making five or six kinds of flour from wheat, the difference between the grades consisting, in all probability, chiefly in the extent to which the separations were carried by means of their hair and linen bolting cloths.

Although much skill in milling, as in most other arts, was lost by the irruption of the northern barbarians, it was not long before men again sought to devise means to make a white and better flour.

In the sixteenth and seventeenth centuries several grindings and boltings were resorted to in France and Germany with this purpose in view, resulting finally in the famous *mouture economique* (or "economical milling") and *mouture Lyonnaise*.

These systems, or rather this system (for the Lyonnaise milling was only the *mouture economique* long drawn out), is chiefly notable because it was an attempt not only to increase the quantity but also the quality of the flour—a rather ambitious aim, considering the crude appliances of those times; for it would be wrong to look for improvements in process while the mechanical appliances of the mills were still in so primitive a condition.

To us who received automatic mills as a bequest from our fathers, it seems strange that no greater advances were made in the methods of milling through all the past ages. But we forget how very primitive were the means of milling until the mechanical revival in the last century.

There was so much room for progress in everything that improvements in process naturally came last.

This is why we find little or no change for the better in milling methods until what is comparatively a recent date. So long as a rumbling millstone, propelled by unsteady power, and with little or no dress, and absolutely no balance, ground the grain, and a hand-sieve performed the bolting, it would be folly to expect elaborated systems to be followed.

Progress naturally took the obvious line of mechanical improvement, resulting in the automatic mill of Oliver Evans, and the wonderful improvements in mill machinery made in his and more recent times. Besides the *mouture economique* in France, the first attempt at gradual reduction in modern times was made in the Austro-Hungarian Empire. Milling had advanced to just that point where economy in the use of material had become a necessity. The Hungarian wheats of eighty years ago were hard and flinty, as they are to-day. So long as the public were not fastidious in the matter of their bread the reduction of this wheat to flour was a matter of no special difficulty. But the taste of the consuming public has been growing more and more refined, and the Austro-Hungarian millers found themselves obliged to grind very high, in order to make a white flour; and though they attempted economy in the use of material by working up the products of this high grinding as well as they knew how and the means at their disposal would permit, the problem of profitable milling with high grinding was not solved until Paur invented his air purifier. Thence the gradual reduction system has been developed in Austrian and Hungarian mills with astonishing rapidity, and carried out with an elaboration of detail which is amazing. Though the gradual reduction practised by American

millers is sometimes called the Hungarian system, it is called so erroneously. There is not in that country a single mill which follows out the scheme of milling practised in Hungarian mills. No American mill could afford to do it. The number of reductions and separations is infinite, and any American mill that adopted this system would be obliged to curtail its capacity at least one-half. Besides, a rigid adherence to this method results in the production of a large percentage of low grade flour, which would not be saleable in any markets at their command. They have visely taken the kernel of the gradual reduction system and left the husk. This, in truth, they were obliged to do, in order to meet the exigencies of the case.

Hungarian milling is profitable only because all of the flour, even the blackest, can be sold, and because the three highest of the nine or ten grades fetch a price which is out of all proportion to the price of standard flour.

Twelve years ago Low Grinding in America was the only possible system, because any attempt to grind otherwise was necessarily accompanied with the production of a still larger amount of the then almost worthless middlings.

The shrewd miller of those days attempted to make as few middlings as possible; because the profitable disposition of them was the pre-eminent problem in the milling of that time. A low grade of flour or the feedbin received them, and the miller aimed to put as little valuable material in these unprofitable places as he could, consistently with the colour of his flour. The invention and introduction of the purifier changed this. It became possible to grind high without being troubled with a nightmare, as to the disposition to be made of the middlings. It not only saved so much stock, but enabled the miller to make a whiter flour by grinding higher.

It required but a short time for the miller to discover that is was profitable to make middlings even if he did not clean the bran, as the "patent" or middlings flour sold at such high prices that he could afford to ignore the quantity of wheat it took to make a barrel of flour. Of course such a state of affairs could not continue long. Every miller who had a purifier launched into making middlings flour, regardless of close yields, and then "came the deluge." The price of patent flour was pulled down, and the question of close yields forced itself upon the miller's attention. It was here that the New Process, as the new system was called, was found to be inherently weak. It could in no way reconcile a close yield with a good percentage of "patent." Besides all this, the growing public taste demanded a good article of wheat flour, and to produce this the miller was obliged to sacrifice a portion of his percentage of patent.

Then came the modifications of the New Process, which we have previously classed as Half-High Milling. Millers ground high, and ground the rich bran on millstones, or cleaned on bran machines. Two reductions of the wheat were resorted to, with results which showed possibilities rather than actual results. All the experiments which have been made in modifying the new process show by their results that the limits of progress in that system are narrow, and that the only practical method of reducing the wheat and obtaining satisfactory results is by a system which will reduce the wheat berry gradually. Those who have followed the new process soon modify it to half-high milling, and the millers on the latter system graduate with wonderful uniformity into gradual reduction. It is only a question of a shorter or longer experience with either of the first-named systems. Sooner or later the conviction forces itself upon the miller that the most money can be got out of the wheat only by adopting gradual reduction. Every step taken in advance on the old system of milling is a missionary for gradual reduction.

The question of fact aside, there is no way of accounting for the wonderful strides which the system of gradual reduction has made, and the vast number of mills which have been refitted, especially in the United States, than on this very supposition. That the introduction of this system has not always been attended with the happiest results has no bearing on the main argument. Many millers have gone into the movement hastily, withouth fully understanding their own needs. Many have been too prone to believe that whatever calls itself Hungarian, or comes to them with a foreign precedent, must be all right. The error is obvious. What may be adapted to the slow and endless millings processes of Hungary, is not, in my opinion, suited to English wants and English markets. A careful study of what is needed in an English gradual reduction mill will save you from drawing hasty conclusions, and reaping the results in leisurely repentance, as many have already done.

Principles of Gradual Reduction.

Primarily the aim of milling is to get the most money possible from the wheat. Any system of milling must propose this end in order to find adherents among millers. Discussions, therefore, of the relative merits of different systems from scientific and sanitary points of view, are quite unnecessary, as they have no real bearing on the question. It matters little to the miller whether his flour is a scientific and healthful flour or not, so long as it meets the popular taste and the public pays the highest price for it. He need not therefore stop to discuss the comparative merits of different kinds of flours from a hygienic standpoint; it is only sufficient to ask what the public demands and will pay the most for.

The answer to such a question rises at once to the lips of every one at all acquainted with our markets. The popular demand is for white, strong flours, and these command the highest price irrespective of their sanitary merits. Fortunately, however, public taste is in accord with science. All the latest researches of scientific men on this subject have proved that white, strong flour from which every particle of bran and germ has been removed, is the best and most nutritious for man's use. This point has been so well established that it does not need enlarging upon. It may be remarked, however, that at a recent gathering of scientists at Vienna, Professor Vogl congratulated his hearers that improvements in milling have enabled millers to produce an article of flour more or less free from bran and germ. So popular taste proves, as it so often does, to have its source in science. The production of strong, white flours, such as the public requires, is scientific milling, and it is as well the most profitable kind of milling, as recent experiences have fully demonstrated. Millers everywhere are bending their energies to enlarge their percentage of such flour, and market quotations furnish proof that in seeking for a profitable system of milling we can safely ignore all processes which do not aim to make the largest amount possible of strong, white flour with a minimum of low grade. For this reason alone, if there were no others, English millers may ignore the Hungarian system of milling as unsuited to their wants. A French writer, Mr. Felix Hardoun, recently wrote a pamphlet to prove that the Hungarian system was not adapted to the mills of France for the reason that there was sale in that country for only two or three grades of flour, and these neither the best nor the worst; but a golden mean between them. The writer took the ground that a simpler system—making fewer grades of flour—was the only one appropriate for republican France, basing his argument solely on the public demand in that country for flour, and reasoning therefrom that French millers must make their own system of milling.

A somewhat analogous argument can, with propriety, be urged in the case of English millers. You need not enquire how foreign brethren of the craft reduce their wheat, but have only to ask what your own markets require and then see by what processes and means this public demand may be satisfied; for success in every department of life consists in meeting some demand, natural, moral, or intellectual, of the world about us. First, let us analyse what the flour is that the public seeks and will pay the most for. The first qualification which this flour must possess is whiteness; the absence of all discoloring matter in the flour. Specks and discolorations arise from three causes; First, from fuzz and extraneous matter which is lodged in the crease of the berry or on the outside and is not removed before the wheat is ground. Second, from the pulverising or comminution of the bran-coating in the process of reducing the wheat; and, third, from the germ or chit which, when ground up, give a saffron cast to the flour.

The strength of flour, the second qualification, depends first upon the quality and quantity of the gluten; and, second, upon the removal of the impurities just mentioned. It is often, though very erroneously, supposed that the strength of flour is wholly dependent upon the first-named characteristic. It has been repeatedly proved that every speck and every particle of bran and germ takes just so much strength from the flour. As a case in point we may cite Graham flour, which contains a much larger quantity and ordinarily a better quality of gluten than white flour, and which nevertheless rises with difficulty and makes a heavy bread. Considerations of the strength, therefore, furnish an additional argument why the flour should be as free as possible from germ, dust and bran.

The system of milling employed has no influence upon the quantity of gluten which the flour contains, but affects, in a very decided manner, its quality. Great pressure may break up the gluten cells and thus destroy, in a large measure, their power of absorbing water—the only measure of strength in bread-making. This is a point of the utmost importance, and while care is taken to enhance the flour's strength by removing all bran and germ particles, it must not be forgotten that its strength may be seriously impaired by bringing to bear upon the middlings a degree of pressure so great as to destroy the delicate organization of the gluten cells. No miller who wishes his flour to be as white and strong as mechanical means will make it, can afford to slight or overlook the importance of any of the points named. Each of them, has its effect upon the character of the mill's product.

The best flour is that from which the impurities have been most completely separated, and which has not been injured in reduction; and as the observance of each of the points given will approximate the product to a perfect flour, so the neglect of them will detract so much from its high quality. It will not do, for instance, to ignore the fact that all wheat contains dirt or dust lodged in the crease. It is there, and no smutter or brush can remove it. Yet if the wheat is ground up before this dust is removed in some way, every miller knows that it cannot be taken out by bolting. This dust, which is undeniably present in all wheat to a greater or less extent, is therefore incorporated in the flour, and adds so much discoloring matter and detracts so much from the strength. When the importance of removing the crease dust was first pressed upon the milling public in America by our firm, interested parties attempted to poohpooh it; but the attempt was not successful, as a proper breaking of the wheat to release this dirt showed both the quantity of the discoloring matter present and its quality.

As to the desirability of removing the germ, there is, I believe, but one opinion now; but in regard to the nature of the bran and the steps which should be taken to guard against pulverising it, some false views are still maintained. The bran is very thin compared with the diameter of the wheat kernel. It is also brittle and easily broken up, particularly the outer coatings. How to so treat the wheat that the bran will not become so weakened as to break up and become pulverized in the reducing operations is one of the problems of milling. The fuzz and adhering dust must be taken off surely, for otherwise they would sadly discolor the flour; but how can this be done without weakening the bran coatings which are already too weak and brittle. It will not do to weaken the bran coverings so as to render them liable to be pulverised when the wheat is reduced; the bran must be kept intact so as to better withstand abrasion while the berry is in the course of reduction. To solve this problem satisfactorily, many millers will be obliged to reconstruct some of their preconceived notions of wheat cleaning. The action of the wheat scourer, while effectual in removing the fuzz and adhering dust, is so harsh as to impair the strength of the bran coats. Any one who will examine wheat bran with a microscope will see this at a glance; indeed, it is not necessary to use a microscope to see the scratches which a scourer of any kind makes upon the bran. No treatment for an article so brittle as bran could be worse than that which it receives from a smutter or scourer; for, having its strength already impaired by the operation, the moment reduction is attempted the crease breaks up, and the fine, filmy pieces, already scrubbed thin, are soon pulverised by the reducing apparatus, whatever the latter may be. Millers who have given the attention to the matter which its importance deserves, have discarded all smutters, scourers, and ending stones, and now rely entirely upon brush machines, retaining separators, of course, to take out impurities not adhering to or forming part of the wheat, like the fuzz: The action of brush machines is gentle, injuring the bran in no way, and at the same time it is effectual enough to rid the wheat of the class of impurities I have mentioned.

On the subject of bolting and purifying I have not now the time to dwell. The importance of both is doubtless appreci ted far more than many other operations in milling and I shall therefore confine myself to the reduction of the wheat only. Suffice it to say that in every system of gradual reduction the bolting or separating should follow each step in the reduction before the product is next reduced; but such operations should not and need not be so hopelessly complicated as an attempt to follow the Hungarian system leads to. The object of making proper separations in bolting and purifying is twofold; and if this object is not lost sight of they need not occasion any embarrassment; *first*, to remove impurities as fast as they are made, and, *second*, to classify or grade the products, so that this work may be automatic.

We have, then, as a rational system of gradual reduction, one which embraces the following points:—

1st. The cleaning of the wheat in such a manner as to remove from the exterior of the wheat berry the fuzz and adhering dust or impurities, and yet in such a way as not to weaken or abrade the brittle bran coatings.

2nd. The removal of the impurities lodged in the crease between the lobes of the berry, which no cleaning machinery, as the term is ordinarily used, can reach.

3rd. The removal of the germ at the base of the berry, which cannot be scoured off except from an infinitesimally small proportion of the wheat, and even then cannot be done without inflicting irreparable injury on the bran coatings.

4th. The gradual reduction of the wheat in such a way as not to abrade or pulverise the bran, and so incorporate these minute bran impurities in the "break" or "clear flour," and also in such a manner as to produce the largest possible quantity of middlings in the best condition for purification.

5th. The final purification of the middlings and their reduction to flour, by such means that the strength or life of the latter is not impaired. These would be the points embraced in a rational system of gradual reduction designed to make the best quality of flour possible; in other words, they embrace points relating to quality alone. Subsidiary to them, and giving the economic side of the question, we may add:—

6th. The production of the largest profitable amount of middlings, or "patent flour."

7th. The minimum quantity of low grade; and

8th. The most thorough working up of all the by-products, such as bran, etc.

It may not always be politic for the miller to pack out the largest possible yield of "patent" flour, since beyond a certain point quantity in the "patent" is obtained at the expense of quality in the other grades; but a perfect system of gradual reduction would have an elasticity in this matter which would allow a miller to guage this production and sack them according to the market demands and quotations. We may add here that the break or wheat flour made under all the conditions I have given would naturally be of excellent quality, and equal, if not superior, to the ordinary "straight grade."

Having these self-evident axioms for our guides, we can now proceed to examine in detail the apparatus at the disposal for millers for gradual reduction purposes, and, keeping in view the ends to be attained by a gradual reduction system, we can intelligently judge of their merits and demerits.

The Millstone.

We may first enquire has the millstone outlived its usefulness, and must it give place to newer and more modern machines? Perhaps no question is directing itself to English millers with greater force than this. Surely no question possesses more vital importance to them than what disposition is to be made, in the milling of the future, of the old familiar millstone. For it is not habit, not experience alone that causes millers to cling somewhat too tenaciously to the burr. It must be remembered that the majority of your ten or twelve thousand mills have been constructed with the millstone as a basis. In these mills it has done all kinds of work, good, bad, and indifferent; and now that it is apparent that gradual reduction is to be the system of milling, the question naturally arises, "What will we do with it?

Some ultra advocates from Hungarian ideas have openly counselled the utter ejection of the millstone as unsuited to the requirements of modern milling. Not to mention the immense loss which the throwing out of the burrs would entail upon the milling industry, the suggestion itself smacks altogether too much of the impulsive zeal of the new convert, which repudiates too much on one side and extenuates too much on the other. The millstone has been entirely displaced in only

a limited number of mills, either in Europe and America, and some of the largest and best which have been built in the past year have either included millstones in their equipment, or made provision for them. I do not believe the mind of the milling public has become reconciled to part with the millstone for good; and the public place in this, as in most other cases, has substantial reasons for its course. It is very much worn but a very true statement as well, that millstones have always been abused in practice, and that we do not really understand their capabilities. While this is true, there must be some reason to account for the growing disaffection on the part of millers from the exclusive use of the millstone. Just as there is a widespread conviction on the part of millers, that the millstone has not been "given a fair show," and this conviction makes millers cling to it, so there must be some good reason why the millstone has been displaced so largely as it has been. If we will but examine the work of the millstone candidly, in the light of the principles of milling just enumerated, we will easily discover the cause of its displacement as well as its retention in our milling, and we will also be able to ascertain its rightful place in a correct gradual reduction system.

With the grinding, biting or abrading action of millstones all are acquainted. It was this quality which gave burrstone precedence over other kinds of stone for milling purposes in the past, when such a grinding action was exactly what millers wanted. For the purpose of getting the most flour out of the wheat at a single grinding, nothing could, or can be, found better than French burr. But the aims of milling have changed. It is not now sought so *grind* the wheat; the desire is to granulate it and grind only the middlings. Is the stone, which was so well suited for grinding, suitable also for granulating wheat, in which it is so desirable to avoid grinding? This could hardly be the case; for the very qualities which made the millstone so perfectly adapted to the old style of milling would militate just so much against it under our present system. Let us look at the matter a little closer. The points to be observed in granulating wheat are as before stated, the removal of the germ and the impurities in the crease, and the reduction of the grain in such a manner that the bran shall not be comminuted, abraded, or pulverized. To accomplish the first of these objects the miller with the millstone is helpless. There is but one way to remove the dirt from the crease of the wheat kernel, and that is by splitting the berry lengthwise along the crease and then separating the dust by means of a wire cylinder. That a millstone might crack the wheat in this manner, to some extent, I will not stop to argue or deny. It is very certain, however, that those who have attempted to break the wheat in this way have uniformly sought for some better instrumentality than the millstone. In cracking the wheat lengthwise the germ is usually released, and granting this might be done on a millstone, at least a partial grinding or reduction of the germ by the biting and abrading action of the burr is unavoidable. Here is the secret of the whole difficulty with millstones. Strive as we will to destroy their grinding action, it still remains in the stone; as this gritty nature was, and is, its highest recommendation for grinding, it is also the greatest objection to its use for granulating purposes; for, clumsy as the millstone is, or rather would be, as a machine for breaking wheat in order to release the dirt and germ, the most serious obstacle in the way of using it to granulate wheat is the very fact that it is a grinding machine. And being such it cannot help grinding off the bran into powdery impurities which cannot be bolted out of the flour. Gradual reduction as a system is founded on a knowledge of the fact that the wheat berry must be treated gently, and that to prevent the incorporation of minute bran particles in the flour several reductions must be employed. Now anyone knows that even one reduction of the wheat on the millstones and grinding high at that will yield a wheat flour full of this pulverised bran. This being the case, three, four, and five reductions on the millstone are not to be thought of, as each reduction would reinforce the amount of this discolouring matter already in the wheat flour.

Nor must it be overlooked that the very fact of the millstone being a grinding instead of a granulating machine, operates not only to produce impurities, but also to make a large percentage of break or wheat flour. This, we believe, has been the experience of every miller that has attempted gradual reduction with millstones. The "patent" has been only moderate in quantity though excellent in quality, and the percentage of "wheat flour" and low grade large and of very mediocre quality.

Another thing must be borne in mind. Those who believe in the capability of the millstone to adjust itself to the needs of gradual reduction assume that the millstone is a perfect machine. Everybody knows that this assumption is entirely gratuitous. With all the care and study that has been bestowed upon it, the burr is far from being a perfect machine in its operations. It is true in some few instances, where really first-class millers are at the helm, the millstone may approach uniform action, but in the majority of instances it does not; and every imperfection of hanging, balancing, and operating, makes it still more unsuited for the purposes of granulation, as they make its grinding action more pronounced. It is true that these imperfections may in time be obtained, but the millstone can never be used to reduce wheat to middlings until it is stripped of its gritty, abrasive nature, and to get rid of this is to get rid of the millstone itself. Perhaps you may ask whether the conclusion of the foregoing is that the place of the millstone in gradual reduction is outside the mill? By no means. The millstone can be very properly and profitably used for reducing middlings into flour. The very qualities which render it worse than useless for granulating render it valuable for grinding the middlings after they have been produced and thoroughly purified. On the contrary, a grinding action, a quick reduction, is exactly what the middlings need to produce a live, strong flour. Our American millers have quite generally perceived this fact, and even in many mills where attempts are made to conform as nearly as possible to the Hungarian system, millstones are yet retained for grinding middlings, and it is exceedingly unlikely that any device will ever entirely supplant them in that function; and here is where the millstone finds its proper place in gradual reduction.

Rolls and Roller Milling.

I will next call your attention to rolls and roller milling, which I assure you deserve more than a passing notice. As to the date of their invention it is well known to those who have looked into the matter, that experiments were made with rolls as far back as 1820. Whether they were a French, Swiss, or German invention cannot be conclusively proved now. In the year named, over 60 years ago, three mills were built—one at Vienna, one at Paris, and one in Switzerland—in which rolls were chiefly used in place of millstones. An eminent French engineer, M. Touaillon, states that Cambray was the inventor of rolls, while other authorities refer their invention to Collier, a Frenchman, and still others to Bollinger, an Austrian. All three of these first roller mills proved failures of a decided kind; but experiments with rolls continueed, and ten years later a Mr. Sulzberger, of Frauenfeld, in Switzerland, announced that he had built a roller machine which avoided all the objectionable features of the earlier ones. An extraordinary *furore* was occasioned by the introduction of this machine. Large roller mills were erected throughout Germany, Italy and Austria. Everyone believed that the day of millstones was over. The mechanical publications of fifty years ago were lavish in their praise of the roll, just as they are to day, and looked upon the complete success of the roller system as a foregone conclusion; and, in fact, there was something to justify all these anticipations. The rolls made good flour, and the mills prospered; and yet, with one solitary exception, before the year 1840 every one of these roller mills had thrown out the rolls and put back the millstones. The revolution certainly went backward. Experiments continued to be made with rolls as before, but it was thirty years before anyone ventured to build another roller mill.

Many explanations of these earlier failures of the roller system have been given, the chief of which is that the machines were not well constructed. Facts, however, disprove completely this assumption, for Sulzberger's roller mill was, to say the least, equal, if not superior, to some of the types of roller mills now in use. Another explanation, which is nearer the truth, is that the roller system was found to be so complex that it could not be handled intellectually or economically. Oscar Oexle, who has given much time to the subject of roller mills and gradual reduction, and is a consistent advocate of rolls under certain conditions, states that the main cause of the failure of roller mills was the reckless application of the roller system to all kinds of wheat. Mr. Oexle holds that only very hard wheats can be treated by a system of all rolls successfully, and that for soft and medium wheats rolls can only be used for certain operations with advantage.

These explanations have more or less force, and to them may be added another which has often been urged with great force as the true reason why rolls sank almost out of sight for thirty years after the fiasco of 1830—33. That is, that the application of the rolls in these earlier mills was too extensive. They tried to use them for everything, and failed. They attributed the failure, very naturally, to the system; and the result was that it was only a question of time when the millstone displaced the rolls. It may be noted here that every attempt hitherto to invent a machine to perform all the reducing operations of milling has proved abortive. If candid and thorough investigation had preceded these attempts, it would have been apparent that no one machine could be constructed so as to satisfy all the requirements of a gradual reduction of wheat to flour; but inventors have gone on attempting to comprise in one appliance principles of operation essential antagonistic, and the result has been disastrous in every case. Anyone who brings an unbiassed judgment to bear upon the matter can hardly fail to see that in milling, as in everything else, eclecticism is best. The candid miller cannot close his eyes to the merits of burr stone, nor to the value of the principle embodied in roller mills, for certain operations in milling; but just so soon as the attempt is made to exclude everything but rolls, failure must eventually result. If the early roller millers, instead of discarding rolls entirely and going back to millstones, had recognized the value of rolls for a part of the reducing process, and had used both in conjunction, striving to remedy by new appliances the radical defects of both for certain operations in milling, rolls would not have fallen into such complete obscurity for so long a time.

The revival which rolls and roller milling has experienced in the past few years has perpetuated in some forms the fatal mistake which led to the abondonment of rolls forty years ago. And there is the same reason for it. When Collier and Sulzberger introduced their roller systems, it was with the conviction that the millstone was not fitted to reduce wheat to flour. We have just seen that if they had not made the fatal error of supposing that, therefore, the millstone was useless and some other machine could be constructed which would do everything, all would have been well. In the same manner millers of late years, both in Europe and America, have found that the millstone could not be used for all operations of gradual reduction. In many cases they have hastily assumed that, therefore, the millstone was useless, and have hailed the rolls because they were claimed by the vendors to do everything that millstones could do, and do it better. The same error of a generation ago is being committed by many millers of to-day, who are adopting rolls for every purpose in milling and for all kinds of wheat. Ultimate failure can be the only outcome of this refusal to profit by experience. Because the millstone is not fitted for reducing wheat, it does not follow that it cannot reduce middlings; nor does it follow that because rolls can do some things better than the millstones, they should supplant millstones entirely. The attempt to make a coachman act as cook and porter, can only result in spoiling a good coachman. Rolls are good enough in their place, but their legitimate place is not to absorb all functions of reduction.

On exceedingly hard wheats like those of Minnesota and Hungary, a complete roller system, employing rolls for all reducing purposes, will doubtless succeed better than if millstones only were used. With millers who use such hard and uniform wheat exclusively, the error of using rolls for breaking their wheat is not so serious a one; it is only a question whether they could not obtain better results by other instrumentalities; but with the miller who uses soft or medium wheats, or mixed wheat, the mistake of using rolls to reduce it is a serious one. The opinions of expert and practical men is not wanting in support of this statement. Mr. Oexle, the gentleman before quoted, who was himself the agent for a roller mill, has said that rolls could not (in wisdom) be used for reducing anything but hard wheats, and experience seems to bear him out.

It would hardly be fair not to judge the roll by the same criterion that we did the millstone. It would be tedious to define the difference in rolls occasioned by the use of gear or belt for driving purposes, or to define the differences of action between rolls of smooth and corrugated face, and the differences of work when the corrugation is sharp and smooth. The theoretical action of the rolls modified by the differential speed, though the extent of this modification is overestimated by interested parties. The rounding of the corrugation and the giving of a differential speed to rolls are merely attempts to disguise in a measure the action which all rolls must have.

The claims made by advocates of roller mills for the reduction of wheat, that they require a third less power than millstones and do not, as millstones, require dressing at frequent intervals, may be granted without the admission settling the matter by any means. Because rolls are superior to burr stones in some respects, does not establish their claim to be considered the best means for reducing wheat; for if we examine the action of rolls we shall find them deficient in many important particulars, so far as the reduction of wheat to middlings is concerned, and this is, after all, the chief question in gradual reduction, to which all other considerations are subordinate.

If anyone will reflect a moment, or, what is better, test the matter in a practical way, he will readily see that whatever the character of the rolls' corrugation may be, it is impossible that a pair of rolls should split a grain of wheat through the crease. When I say impossible, I do not mean to imply that a wheat kernel is never so split by rolls, but simply to assert that every such instance is the result of an accidental relative position of the wheat berry to the corrugations. No roll has been, or probably ever will be, devised which can split the berry in the manner described with anything like regularity. All rolls now in use break the wheat not in the manner which has been shown to be desirable, but in a hap-hazard manner, the only result of which is to reduce the size of the particles to be handled, and not to take out the discolouring dust when it is found in the crease.

If you will examine minutely the product of a first break on rolls, you will fail to observe evidence of any particular intention in breaking the wheat beyond reducing the size of the particles to be handled as mentioned before. You will find the wheat broken in every conceivable shape, and only in a few instances broken longitudinally. Of course this is a step towards gradual reduction, as the size of the material is thus reduced; but no good end is subserved farther than this, for the dirt of the crease is still in the particles of broken wheat. That this is literally true, is shown by the fact that the break flour of the first reduction with rolls is quite white and clear. That the action of fluted rollers is less injurious than the millstone, and comminutes the bran in a less degree is an undeniable fact, but that they are not perfectly or even well adapted to the gradual reduction of wheat is proved by the no less undeniable fact, that the "break flour" produced by each successive reduction grows poorer and poorer.

Nor can it be denied that the breaking of the wheat into ragged, irregular shapes by a first reduction on corrugated rolls, facilitates the comminution of the bran coatings in subsequent reductions. This, coupled with the incorporation of the dirt with the break flour, will account for the inferior color of the break flour produced by roller mills. Some of these mills, it is true, do not show an inferior article of what is called wheat or break flour, but it will be found that these same mills do not make the regulation amount of "patent" or semolina flour, for at a certain point it is politic to sacrifice a percentage of the "patent" in order to be mixed with and thus hold the wheat flour up to a good marketable grade. And it may be here added that the reports of the percentage of "patent flours" obtained by roller systems of reduction are generally pleasant fictions. Satisfactory proof of roller mills and roller systems making a large percentage of "patent," and a good article of clear flour, with close yields, as their every-day work, is lamentable deficient. Few if any roller millers that make great claims will afford any opportunity of verifying their assertions in this particular.

What I have said of the action of corrugated rolls in comminuting the bran is measurably true of the germ, the importance of removing which is now universally conceded. Nature points out, in the very location of the chit or germ, the manner it should be removed. The only effectual

(*Continued on page 75.*)

UNITED STATES MILLER.

E. HARRISON CAWKER, EDITOR.

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MILWAUKEE, SEPTEMBER 1882.

We respectfully request our readers when they write to persons or firms advertising in this paper, to mention that their advertisement was seen in the UNITED STATES MILLER. *You will thereby oblige not only this paper, but the advertisers.*

Flour Mill Directory.

CAWKER'S AMERICAN FLOUR MILL DIRECTORY for 1882, was completed, ready for delivery February 1, 1882.

It shows that there are in the United States 21,346 flour mills and in the Dominion of Canada 1,488. The mills in the United States are distributed as follows:

Alabama, 388; Arizona, 17; Arkansas, 284, California 209; Colorado, 52; Connecticut, 309; Dakota, 44; Delaware, 96; District of Columbia, 7; Florida, 81; Georgia, 514; Idaho, 18; Illinois, 1258; Indiana, 1163; Indian Territory, 3; Iowa, 872; Kansas, 437; Kentucky, 642; Louisiana, 41; Maine, 220; Maryland, 349; Massachusetts, 363 Michigan, 831; Minnesota, 472; Mississippi, 297; Missouri, 942; Montana, 20; Nebraska, 205; Nevada, 10; New Hampshire, 202; New Jersey, 445; New Mexico, 28; New York, 1942; North Carolina, 556; Ohio, 1462; Oregon, 129; Pennsylvania, 2786; Rhode Island, 47; South Carolina, 205; Tennessee, 620; Texas, 548; Utah, 129; Vermont, 231; Virginia, 689; Washington Territory, 45; West Virginia, 404; Wisconsin, 780; Wyoming, 3; Total, 21,356.

The directory is printed from new Burgeois type on heavy tinted paper and is substantially bound. It makes a book of 200 large pages. The post offices are alphabetically arranged in each state, territory or province. The name of the mill, the kind of power used and the capacity of barrels of flour per day of 24 hours are given wherever obtained which is in thousands of instances This work is indispensible to all business men desiring to reach the American Milling Trade.

Price Ten Dollars per copy on receipt of which it will be sent post paid to any address. Remit by registered letter, post-office money order or draft on Chicago or New York made payable to the order of E. Harrison Cawker, publisher of THE UNITED STATES MILLER, Milwaukee, Wis.

THE Dominion Millers Association met Aug. 7, at Toronto, Canada, and considered matters of especial interest to Canadian millers.

HUNGARY reports the best harvest for twenty years. The estimated yield for 1882 is, of wheat 125,000,000 bushels; rye 45,000,000; corn 110,000,000; barley 40,000,000.

MINNEAPOLIS millers say that they will grind 20,000,000 bushels of wheat in the coming year. Milwaukee millers will grind 12,000,000, and St. Louis millers about 15,000,000 bushels.

THERE was never such a time for building grain elevators. At almost every railroad station in the West new elevators are being built, or old ones enlarged. The bounteous harvest will give the elevator men a "boom."

THE bottlers of mineral waters, beer, etc., have an official newspaper styled *The National Bottlers Gazette*. It is published by W. B. Keller, in New York, is handsome in appearance, and the subscription price is $2.00 per year.

WE welcome to our table *The Roller Mill* a monthly Journal, published at Buffalo, N. Y., by A. B. Kellogg. Subscription price, $2.00 per year. Buffalo is the only city in this country that can boast of two milling papers published in the English language.

Personal.

MR. M. WALSH, President of the Minneapolis City Common Council and manager of the Cataract Mills, has returned from a visit to Ireland, his old home.

WE recently had a call from Caleb Harrison, C. E., who lately graduated at the Wisconsin State University at Madison with high honors. Mr. Harrison has accepted a position with the engineering corps of the Milwaukee & St. Paul Railway.

COL. COLLINS, of the Garden City Mill Furnishing Co., of Chicago, is now on a visit to Colorado, to look after his extensive mining interests.

Halcyon Days for Wisconsin Editors.

A TRIP TO THE "LAND OF THE DAKOTAS."

In accordance with the custom of the editors in the State of Wisconsin they met August 8th to observe their twenty-sixth anniversary in the beautiful city of Hudson on the picturesque banks of the river St. Croix. The reception committee appointed by the good citizens of Hudson met our party numbering not far from 200 gentleman and ladies and escorted them in carriages to their hotels and elegant dwellings and provided for their comfort and amusement in a most hospitable manner during our stay of twenty-four hours. The routine business of the Association was speedily completed and the President, Leut. Gov. Sam. Fifield of Ashland and Secretary Hon. Ed. Coe of Whitewater, were re-elected to fill the same positions during the ensuing year. After this business was transacted the party were driven about the beautiful city and subsequently treated to a steamboat excursion on Lake St. Croix. On the morning of the 9th the party started by special train on the Chicago, St. Paul, Minneapolis & Omaha R. R. and St. Paul, Minneapolis & Manitoba R. R. to Lake Minnetonka, where the day was spent in serene enjoyment on board the magnificent passenger steamer, *the Belle of Minnetonka*. The scenery that can be viewed during a days excursion on this boat is positively bewitching. It is worth going thousands of miles to see, and no American should spend time and money in going to Europe to view natures beauties until he has first seen this one at least of the gems of the GREAT NORTHWEST. It is easily accessible from St. Paul or Minneapolis by the St. Paul, Minneapolis & Manitoba R. R. After taking supper and spending a couple of hours at the Hotel La Fayette, which is a fine hotel and would be deserving of great patronage if its charges were more reasonable the party left on the St. Paul, Minneapolis & Manitoba for the West.

We reached Moorhead Minn., early the following morning and the morning daily papers were placed in our hands, which amongst many other good things told us that 250 spring chickens had been slaughtered for our breakfast. Upon investigation at the breakfast table, we were confident that the local scribe had simply told the unvarnished truth.

The Grand Pacific Hotel at Moorhead is a wonder considering that the country out there has been settled but a comparatively short time. The people of Western Minnesota and Dakota, call their country "Wonder-land" and it is indeed appropriate, for wonders met our eyes every where as we passed through the country. After breakfast we crossed over to Fargo, in Dakota and after some very interesting exercises including speeches, and music, both instrumental and vocal we drove out to see the city and then out into the country a few miles to inspect the wheat fields.

Gaze where you would, it was wheat, *wheat*, WHEAT. FORTY BUSHELS TO THE ACRE OF NO. 1, HARD.

That is what they claim and the writer believes that this year they will in many sections of that country realize their expectations.

The backbone of that whole country is *hard spring wheat*, and so long as good crops are secured and reasonable prices can be obtained that country is bound to develop more rapidly than any other land ever has done. It is perfectly wonderful to see such thriving cities as Moorhead, Fargo and Grand Forks in a land which a decade ago was almost unknown. This great wheat section is rapidly filling up with a sturdy enterprising class of citizens from all parts of the world. It is claimed that wheat can be raised there at a cost of only 36 cents per bushel. Flouring mills on the most modern systems, of large capacity are being erected at many points in Dakota which have a home market at good prices for a very large share of their produce.

At GRAND FORKS the citizens met us with bands of music and escorted us in carriages to the City Hall, where the ladies of the city spread before us a *royal* banquet and waited upon us with their own fair and willing hands and we must confess we enjoyed the hospitalities of the citizens of Grand Forks *immensely*. Had we space to spare we would tell of the many good things said on this occasion, things long to be remembered, but we will only further record that as our train rolled away from their depot our hearty cheers for the enterprising Grand Forks people rose high and clear over the broad and fertile prairies of Dakota. We returned from Grand Forks to St. Paul via Fergus Falls & Lake Osakis.

In conclusion we beg leave to return thanks for curtesies shown to us by the Milwaukee & St. Paul Railway; the Chicago & North-Western R. R. Co; the St. Paul, Minneapolis & Manitoba R. R. Co; the Chicago and St. Paul, Minneapolis & Omaha Railway Co; to the Captain and owners of the steamer *Belle* of Minnetonka and to citizens of Hudson, Moorhead, Fargo & Grand Forks.

We would further say to the business men of Milwaukee, Chicago and all points further East, that if they have not been out to see this Great Northwestern wheat field, that they can not imagine what a country it is until they visit it. They may read, and read and half believe what the read, but they must SEE it to realize its immensity. We have seen it. "GO THEN AND DO LIKEWISE".

Fires.

FENNIMORE & COOPER'S mill at Palmerston, Ont., burned July 29th. Loss, $20,000. Insurance, $10,000.

A. SWAWSON & SON'S mill at North Branch, Minn., burned recently. Loss, $,8000. Insurance, $6,000.

BURNED—V. W. Dorwin's mill at Durand, Wis. Loss, $10,000. Insurance, $5,000.

GEO. V. HECKER & Co.'s Cherry Street Mills in New York City, were destroyed by fire July 31. Two men were killed. Loss $400,000 on mill, fairly well covered by insurance. The mill will be rebuilt at once.

BURNED—Aug. 4, J. G. Mold & Co.'s flour mill at Sunrise City, Minn. Two men perished in the flames. Their names were John Lock and John Holmquest. Loss on mill, $10,000.

BURNED, Aug. 18, Smith & Burleson's elevator and mill at Villisca, Ia. Loss, $35,000. Insurance, 25,000.

BURNED, Aug. 19, Cole & Beeler's flour mill near Jeffersonville, Ind. There were stored in the mill 3,000 bushels of wheat which were burned. Loss, about $12,000. Insurance, $5,000.

HOW BOYS MAY LEARN THE TRADES.—The New York Herald says that its recent article on the "Scarcity of good workmen," elicits considerable commendation: One writer attributes the lack of opportunities for apprentices to the subdivision of labor which has been brought about by the introduction of machinery and the tendency to do almost all kinds of manufacturing on a large scale. Another insists that the trades unions protect the apprentices, although they limit the number; he also makes the excellent suggestion that the unions should insist that every apprentice shall be properly instructed instead of being kept at the simpler kinds of work, in which boys can be most profitable to their employers. Two others complain that as soon as boys learn enough to make them of any value they desert their employers in search of higher wages. In answer to these last we need only say that apprentices are never taken haphazard from among boys, and that an apprenticeship contract, made between an employer and a boy's parents or guardian, can be enforced by law. The change of means and methods in some trades is undoubtedly disadvantageous to boys who wish to learn these trades, particularly in large cities; but there still remains a wide range for young men with a taste for mechanics. For instance, a boy who would be a cabinet-maker might work seven years in a large factory without learning much. If, on the other hand, he were to spend only three or four years with a repairer who has only a little shop, he would learn so much about construction, materials, styles and finish that, if he had any taste, he could in a small shop of his own sell at a handsome profit whatever he might design and make, for the revolt against machine-made furniture increases as time goes on. Thousands of boys want to learn the printing business, believing it a stepping-stone of a newspaper, but in New York they cannot do it, even by paying for the privilege, for no single establishment, however large, covers the business in all particulars. The boy's only method is to become a good typesetter, and then go to a country office where, by sacrificing a portion of his time, he may slowly acquire the other details of the profession. No large machine shop is the proper place for a bright boy; he can learn more in a village blacksmith shop, were many kinds of machinery are brought for repairs. We have already suggested the only way in which boys can become competent builders, and the method outlined, like those indicated above, hints at the only proper way to study any comprehensive mechanical business at the present day. Success depends more upon the spirit of the boy than that of the employer. The boy who cares only to earn large pay, and do it quickly, cannot succeed in learning a trade; but he who wants to *learn* and is willing to waive immediate large returns for the sake of good chances to learn, will in the end become a competent journeyman, and, what is more, an expert of the class from which come all the foremen, "bosses," designers and inventors.

The Wheat Tester.

BY S. C. BARTON, PRESTON, MINN.

Is not, as is often supposed, intended to defraund the farmer, but to ascertain the specific gravity of the wheat upon which its commercial value largely depends, thereby to mete out equal and exact justice to both buyer and seller. It is used in all large commercial transactions between dealers throughout the country, without the slightest protest, or thought, that it is an instrument of fraud. It does not, in any degree determine the actual value of the wheat, but only its relative value. It detects at once any defects not readily apparent to casual observation, such as moisture, imperfection in the berry, improper cleaning, etc. Now these are all proper objects of search in the buyer, to which it would seem that no reasonable honest seller could object, but such is the prejudice existing against this innocent instrument that its use is quite often objected to, the mean objection being that the buyer is so very careful in the filling. Now upon this very care depends the uniformity of the test, and consequent utility of the instrument. A reasonable expedition in the filling is expected, and if each buyer is equally careful, almost exact uniformity is attained, which is the object sought. I venture the opinion that if a sample of reasonable clean wheat be tested here by a competent person, then inclosed in a tin case, so as to preserve a uniform humidity, it may be sent successively to all the large commercial wheat centers in the country there to be retested without the variation of one-fourth of a pound in the test. Now I ask could this be done were the lest carelessness tolerated in filling the tester? I may add that, as a rule, the poorer the quality of the wheat the more strenuous the objection to the use of the tester, no objection being made when the crop is uniformly good. To illustrate: Say it requires four bushels and fifty pounds of No. 2 wheat to make a barrel of flour of a certain grade, according to the present and universally accepted method of testing. Now is it not plain that if we fill the tester more compacity to suit the views of the seller, that the same wheat which before tested No. 2 will now test above No. 2, or that an inferior grade of wheat will test No. 2, so that we cannot make a barrel of flour of four bushels and fifty pounds of wheat according to the latter test, but that it will take say five bushels, and even with that amount at the expense of the grade of flour. Now when we consider that the mill is the final test to which all wheat of every grade, whether soild to the miller or to the shipper, must ultimately be subjected, also that the flour and feed are the final results, and that the price obtainable for this flour and feed, less the cost of manufacturing, must regulate both the price and grade of the wheat bought, it follows, therefore, that neither the farmer or seller can hope to contravene the laws of trade, which are as unchangeable as the laws of the Medes and Persians, by making an unwarrantable war upon the use of the tester. It is true our legislators have interdicted its use. They might with equal propriety have made it penal to put on glasses when examining goods for purchase, lest they reveal latent defects, or prohibit the probing of a jar of butter or a barrel of flour, lest the seller thereby lose a sale. But we may tolerate them in this innocent amusement, charitably remembering that where little is given, little is required.

Wanted an Understanding.

An Illinois merchant who was taking baking powder in bulk from a Chicago firm, called at headquarters the other day to say that there was something wrong with the goods.

"I don't think so, was the reply; we make the best article sold in the west."

"I think we ought to have a more perfect understanding," continued the dealer. "Now, then, you adulterate before you send to me, then I adulterate before I ship, then the retailer adulterates before he sells, and the consumer can't be blamed for growling. I wanted to see if we couldn't agree on some schedule to be followed."

"What do you mean?"

"Why, suppose you put in 10 per cent. of chalk, then I put in 20 per cent. of whiting, then the retailer puts in 30 per cent. of flour; that gives the consumer 40 per cent. of baking powder, and unless he's a born hog he'll be perfectly satisfied. You see, if you adulterate 50 per cent. on the start, and I adulterate as much more, and the retailer adulterates as much as both together, it's mighty hard for the consumer to tell whether he's investing in baking powder or putty; we must give him something for his money, if it's only chalk.

THE large brick works at Deconshire, England, are to be run by the celebrated Victor Turbine, manufactured at Dayton, Ohio.

The Electric Light in Flour Mills.

Mr K. W. Kunis, editor of *Die Muehle*, writes as follows concerning the article on the above subject which appeared in our August number.

"The article of Mr. Haempel, recently published in the *Ungarische Muehlen Zeitung*, has excited much interest. Having been occupied for a considerable time with the question of the electric lighting of mills and having studied the exhibition at Paris, I have to say that for the present there exists no particular system which can be recommended without hesitation, but that unquestionably the electric light will be adopted for mills some time in the future. The incandescent light is indeed less rational than other systems, which give more light at a lower price, but it is preferable in so far as it enables the application in mills of a much greater, and so to say unlimited number of separate lamps within a given electric current. For it is the small divisibility of the electric current which is against the application in mills of the other systems. This drawback is happily avoided by the incandescent light. Concerning the creation of the electric current a letter from Messrs. Siemens & Halske, in Berlin, of the March 71 this year, remarks as follows:—"For electric lighting a motor is required, having a regular and equal action, which sets the electric machines in motion. These machines are always used in pairs; the smaller, or primary machine, creates a continuous current, which is conducted into the larger or secondary machine, and creates in the latter powerful electromagnetical effects. Between these electromagnets of the secondary machine, a ring, fitted with wire coils, rotates, in which strong electric currents are induced, which are conducted to the lamp". Now in those lamps whose light is created by the electric 'arc' the current is conducted to thin carbon sticks, whose points are at a certain distance from each other, and here the sparks dart from one point to the other and thus create the electric arc. The differential electric lamps of Messrs. Siemens & Halske regulate by means of the current the distance of the carbons, and thus cause the electric light to be in a high degree equable and quiet. Messrs. Siemens & Halske apply the lights in three degrees of strength of say about 15, 35 and 120 gas flames, each equal to ten sperm candle lights. By surrounding the light with one or more opaque glass globes it is properly subdued, so as not to dazzle too much and make the shadows too strong. The cost of the installation amounts on the average, with moderate lights (equal to 15 gas flames each), with 8 lamps, to 5,100 marks (£255), with ten lamps to 5,900 marks (£295), with 12 lamps 7,300 marks (£365), with 14 lamps 8,100 marks (£405), with 16 lamps 9,200 marks (£460), with 20 lamps 10,800 marks (£540), including a total length of conducting wire of 50 meters for each lamp and 1,000 metres for connection with the motor. The carbons burn five hours, after which they must be renewed. The power required for a lamp is 0.75-h.p. indicated.

The incandesent lights are lamps in which a piece of wire, or a carbon filament, is heated to a white heat and thus gives light. It may be sufficiently known that the electric current, when it goes through a metallic conductor, warms this conductor. When the electric current goes from a large conductor to a small one it becomes contracted or compressed and there arises a considerable friction within the conductor, and the warmth is increased to such a degree that the thin conductor quickly attains a temperature of 1,500, 1,800 and 2,000 deg. C, and thus spreads a strong light (the incandescent light). This light is less dazzling than that produced between two carbon points. As the oxygen of the air would very quickly consume the white glowing wire of the carbon filament, it must be enclosed in air-tight evacuated globes, and would require no renewal if the action of the electric stream did not gradually dissolve infinitely small particles of the carbon. This dissolution of the wire or carbon filament, occurs slower or quicker according to the substance employed, and, therefore, this substance, and the shape of the filament, whether horseshoe, or loop, etc., constitutes the main differences of the various electric lighting systems. The incandescent light is nothing new, but it had, on the contrary, long been contemplated to utilise it for lighting, but it was held to be disadvantageous because the electric arc gives light at a smaller expense; in practice, however, it had been generally overlooked that it is more important to have the light distributed in different places, than to have an extraordinary mass developed in one point only, and as the former desideratum occurs much more frequently than the second, the incandescent light which fulfils the first of these requirements may probably in future be found the best for most purposes, unless the divisibility of the electric current should succeed much better than hitherto. With regard to the special lighting of mills by electric light, the incandescent light appears to be far more adapted than the arc light, in consequence of the many objects in mills which throw shadows. The power required for incandescent lamps will probably be nearly equal to the amount named above for arc lights, and as a motor with equable action is necessary, the views expressed by some correspondents that the installation of electric light in a mill hardly costs anything, is too optimistic. Not every mill has the necessary power for driving a dynamo-electric machine, and not every mill is so arranged that its driving gear can be easily disengaged whilst the motor continues in action. Generally the suspension of the work is effected by the stopping of the motor, and Mr. Van den Wyngaert has already explained in his paper, what then happens with the electric lighting.

Electric lighting in a mill either requires an independent motor or an independent driving gear; and at the same time an arrangement for stopping the mill while its motor continues work. Therefore, in the latter case it also requires a suitable governor for regulating the great difference of power required after stopping.

From these short explanations it follows that the electric light, no doubt, merits that increasing attention from millers, which I have devoted to it for some years, but it has not yet reached a stage at which it can be unreservedly recommended to millers; as, however, daily progress is made in electric lighting it is very probable that in a short time it will be rendered free from the above named imperfections.

Cold or Warm Grinding.

A Buda Pesth miller wrote recently to the *Ungarische Muehlen Zeitung*, as follows in reference to warm and cold grinding :—

A customer of my mill, one of the best-known bakers of the capital, informed me recently that some lots of flour, in spite of the great reputation, yielded a bread which possessed a kind of tastelessness which no addition of salt could remove. If he had such flour he added to the dough a small quantity of solution of sugar, which remedied this fault. He also advanced the opinion that it was caused by reduction on rolls. I had occasionally noticed the tasteless bread, but had attributed it to the baker and the faults in his process, but now the fault was laid at the door of roller mills. I determined to investigate for myself, and did so with satisfactory results.

I allowed part of a lot of middlings to to be floured by a roller mill and part between stones, and set aside a sack of each for test. The baker was right; the roller flour gave the well-known tasteless bread, while that from the stones did not possess this bad quality. I was confronted by a fact the explanation of which took me several days. Then I measured off exactly equal quantities of the flours. Weighing showed that from the stones was heavier than the other. My conclusion was then confirmed—a conclusion based upon this reasoning :—

If the stone grinds hot it consumes a large part of the "fermentability" of the flour, besides the difficulty of bolting properly. If it only grinds warm, as opposed to cold, then there arises in the flour, under the action of the air, a kind of fermentation, or rather oxidation, and it must therefore be heavier than that which grinds absolutely cool. This same reason shows that the cause of the tastelessness of the bread lay in the lack of fermentation of the flour.

The baker had noticed this tastelessness only occasionally, but in my mill the reduction had been carried on for several years by rolls. These, therefore, could not be the cause of the trouble. I rigged up an exhauster which had long since been thrown aside and connected it with a run of buhrs. On the other side the rollers were set to run faster. The flour products thus obtained gave bread of equally good taste. The stone could not grind cool enough, in spite of the exhauster, although it was run slowly, to avoid a fermentation arising in the flour, while the rollers, although running swifter than before, produced just the requisite temperature for this fermentation, and no more. A lesson follows from this, which we were unable to learn under the sole rule of the millstone—that absolutely cold grinding is as injurious to the quality of flour as hot grinding, the latter being impossible on rolls. Accordingly in times of business depression, when work is not pressing, one should rather use fewer rolls, run rapidly, than all, run slowly. As regards the difference in specific gravity between fermented and unfermented flour, an exact investigation would be very interesting. I cannot explain it, but I believe after the matter is agitated, it a solution will be found.

If, now, complaints are made about the too warm grinding of roller mills and machines are sought which will grind cooler, this is simply an error. The roller mill cannot grind too warm, and the temperature which is obtained by rapid motion, is just that which is necessary to set up that sweet fermentation in the flour which gives bread its peculiar nutty flavour, and which is wanting in flour, that, owing to slow grinding, does not reach the necessary temperature for the transformation of any of its elements into sugar.

Another question touches the probable greater durability of the unfermented flour; still, this is only of theoretic interest, as dry flour made upon stones has proved to be of excellent keeping qualities, and does not spoil easily. Finally a chemical examination of fermented and unfermented flour would be productive of interesting results. It seems unquestionable, that in the further processes of fermentation the dough must differ in the two cases, and produce a different result. To the superficial observer this difference would only become evident in the taste of the bread, but scientifc investigation would certainly disclose much that is new, and might give many valuable hints for the treatment of flour made on rollers.

Duties of an Engineer.

Above all other things the boiler should be kept clean; the manner of doing this will depend on the construction and kind of boiler used. Before blowing out the water to clean the boiler, see that there is not over ten pounds of steam, and that the fire has all died out in the furnace. After blowing out, let the boiler cool; then take out the hand hole and with a force pump and hose wash out all the loose mud. It may then be necessary to take the scaling tools and remove all the scales that can be got at. It is a good idea to raise the safety valve while filling the boiler, as it provides a way for the air to escape while the water is going in. Before firing up in the morning, or at any other time, see that there is plenty of water in the boiler: if it is low, fill up before placing the fire in the furnace. To kindle your fire, put a thin layer of coal over the grates, then place the kindling and wood on this; after the fire has commenced to burn, put in another layer of coal, and you soon will have a bright fire. Do not fire up too fast when the boiler has stood a few days, as forced firing is injurious to both the boiler and masonry. Keeping the water at the proper height is of considerable importance to easy firing. The practice of turning on the water and letting it run up, and then shutting it off and allowing it to run down, is a poor one. Feed the water just fast enough to supply the demand. Oil the engine before starting it and keep the oil wiped off where it is not needed. Spend a few minutes every day in cleaning up the engine, removing all extra oil, wiping off the dust and dirt, and see that everything is in good working order. Always open the cylinder and drain cocks when you stop your engine, and close them after the engine has started. In oiling the cylinder do not admit the tallow till the engine is under way and the cylinder drain cocks are closed. Do not start your engine too fast but let it come up to speed gradually. Be sure that you keep your eyes open and tend to your business.—*Wood and Iron.* (*Minneapolis.*)

A Sight Rarely Seen.

Moorhead News, Dakota: Looking south from the windows of the Grand Pacific hotel nowadays it is possible to see a sight that no part of the civilized world can equal. Stretching away into the horizon is a boundless field of grain. It extends fully thirty-five miles; it is mostly wheat and partly oats and barley. In all that distance which can easily be seen over the level prairie there is not a single rod of fence to obstruct the way, and a harvester might be started on the farm of the millionaire farmer, E. C. Sprague, and journey nearly two days without meeting such a thing as a fence. In all that extent of country, horses and cattle are picketed or watched by herders, and the farmer saves the incalculable cost of building fences. This is a grand country with its prodigal soil, but it is grander still in the intelligence and thrift of its level-headed settlers.

Increasing Demand for Machinery.

The Machinist remarks that a few weeks ago the press of orders for machinery and tools was declining, and many of the manufacturers were apprehensive of actual dullness before the opening of fall trade in other branches of business. Those who had steadily been refusing orders were many of them willing to re-open correspondence with prospective purchasers, and in some cases extreme prices were moderately shaded to secure a few desirable customers. The past three weeks have shown a decided change in the situation. Purchasers who were awaiting events are becoming anxious, and are hastening to place their orders for fulfillment at the earliest practicable moment. Reports that reach us from different quarters, both East and West, as well as our own observations among the shops, agree that a renewed activity has sprung up this month, which was hardly to have been expected in midsummer. If we look for causes, we can, perhaps, discover nothing more potent in bringing about this accelerated movement than the prospect of bountiful crops, especially of breadstuffs, which are likely to be in good demand abroad. The activity in railroad building and equipment will be greatly strengthened by the now almost certain prospect of good crops; and upon the railroad industry more than any other single business depends the demand for machinery and tools. No more rapid progress in railroad construction could be desired than already exists. All that is needed to sustain and push forward the work on so large a scale is a reasonable assurance that enough transportation business can be obtained to make both new and old lines pay expenses. Profits are usually left to the developments of the future. Several railroad enterprises are undoubtedly in advance of public requirements, but the rapid growth of the country—more rapid than ever before—will in time render the lines valuable that are now unnecessary. Locomotive building has not experienced any such check as was reported in daily papers a few weeks ago, and is not likely to be retarded for months come.

Overloading Safety Valves.

The practice, which prevails extensively, of loading the safety valves of steam boilers beyond the proper limit, is a most dangerous one, and cannot be too strongly condemned. Cases are very frequent where, by this means, old boilers, worn and thinned by corrosion, are regularly worked at a much higher pressure than they were originally intended for when new. There can be but one result of such a course, and that points unerringly toward disaster. The wear and tear of a boiler so overloaded and overworked is vastly increased, so that little if any economy results from the practice. It is true, that, in times of great business prosperity, when every department of a manufacturer's establishment is driven to its utmost capacity, the temptation to overwork a steam boiler is very strong; still the practice is, under any circumstances, wholly inexcusable. With most kinds of machinery, the only result of overwork is simply the failure of the machinery and the consequent pecuniary loss; but with steam boilers the case is different. Here the damage, in case of accident, is not confined to the boiler itself, or even destruction of adjacent property, but human lives are almost invariably sacrificed. We think every one will agree with us when we say under no circumstances is the imperilment of people's lives justifiable. Everything should be done that human knowledge renders possible to make the use of steam perfectly safe.

Dalrymple's Great Farm.

Bismarck Tribune, Dakota: Dalrymple, the great bonanza farmer, is cropping this year 57,000 acres of land. This vast tract is divided into farms of 6,000 acres each. Over each of these is placed a superintendent. These farms are subdivided into the divisions of two thousand acres each, which are in the charge of a foreman. Each subdivision of two thousand acres has its set of buildings, comprising boarding houses, stables, granary, machinery hall and blacksmith shop, and are connected with the superintendent's headquarters by telephone. Each 5,000 acres has its superintendent, bookkeeper storehouse for supplies, from which goods are taken on requisition to the different divisions. Wages for the past year have been $20 a month until harvest and $2 a day through harvest and $30 a month for fall plowing. The best hands get $20 and inferior ones $25 for fall work. The farmer has the choice of two outlets for marketing his grain: one the immense milling demand of Minneapolis, the other, Buffalo and New York markets by way of Duluth. Wheat can be raised and delivered at the railroad in ordinary seasons for about 36 cents a busnel, and it costs from 25 to 27 cents a bushel to ship it to New York. The average yield is twenty bushels.

Items of Interest.

YEAST mixed with about one-eighth of pure glycerine will keep well for a long time if placed in a cool cellar or camber.

THE Supreme Court of Michigan, in a recent decision, held that damages for the non-performance of a contract to deliver mill machinery can not be measured by prospective profits, unless the same can be estimated with absolute certainty.

THE question of industrial teaching in the public schools is not yet a settled one, in spite of many loud proclamations. It may well be considered if it be worth while to add anything to the already crowded course of instruction. It is hardly wise to promote superficiality. Special technical schools, however, cannot be advocated to heartily.—*New York Tribune.*

A BELGIAN engineer is said to have invented a process by which he can weld steel at a red heat. He keeps an essential portion of his method a secret. It seems, however, that he carefully polishes the surfaces to be united, smears them over with some sort of liquid, raises the temperature of the metal to redness, and then joins the pieces. After severe tests, bars welded in this way were in no instance broken at the point of juncture.

A BOAT to be used for the purpose of a floating sawmill has been built on the river at Nashville, Tenn., for operation on the upper Cumberland. The design of its projectors is to buy pine, cedar and walnut timber on the banks of the river, and to convert it into lumber for market on the vessel, at the rate of several thousand feet per day. The vessel is a novel structure, 100 feet in length and twenty-two feet wide, and has a full sawmill equipment.

MAORI MILLERS.—An instance, says an Auckland (New Zealand) correspondent, of the advancement of the native race at Raglan, is to be found in their enterprise in milling. A second flour mill is to be erected for Hone to One, at Pauwewe, Kawhia. It will be built by subscriptions raised among the Maoris living in Kaphia and Aotea, and a boat is also to be built for them to transport the flour to the various settlements on the shores of the harbor.

NAILS.—Many persons are puzzled to understand what the terms fourpenny, sixpenny, tenpenny, mean as applied to nails. Fourpenny means four pounds to the thousand nails, sixpenny six pounds to the thousand nails, and so on. It is an old English term, meaning at first tenpound nails (the thousand being understood); but the old Englishman clipped it to tenpenny, and from that it degenerated until penny was substituted for pounds. So when you ask for fourpenny nowadays you want those which will weigh four pounds. When a thousand nails weigh less than a pound they are called tacks, etc., and are reckoned by ounces.

THE great Gothard tunnel, which was opened on the 1st of January of the current year, is nine miles and 564 yards in length. In the construction of "this wonderful hole through the mountains," an average of 2,347 men was engaged per diem, and work was carried on day and night. During the entire period of the construction about 1,000 tons of dynamite were used for blasting, and 1,700 tons of oil for illuminating purposes. The entire amount of rock removed in making the tunnel was about 1,200,000 cubic yards, and the lining of the inside, which has an area of 258,000 square yards, took up about 220,000 cubic yards of masonry. The average cost of building the tunnel per lineal foot was about $73.85. The time occupied at the work was exactly 3,330 days.

LEATHEROID is a new article which is being made of paper. It consists of a number of thicknesses of cotton paper wound one upon another over a cylinder. The remarkable qualities of strength and adhesion it possesses are derived from a chemical bath, through which the paper is drawn on its way to the cylinder. The effect of the chemical bath on the paper is said to be wonderful. Leatherorid, for the purposes it now serves, consists of about 20 thicknesses of paper; it is shaped upon or around molds, while wet, into the form it is to represent, and will hold that form perpetually when dry. When dried, it is as difficult as rawhide to cut with a knife. A company has been formed at Kennebunk, Me., for the manufacture of this article, and will at once build a large mill there for that purpose. This company is making, for introduction into the mills, roving cans, boxes, etc., to take the place of tin cans and wooden boxes. Cans made from this material are about one-fourth the weight of tin cans of equal size; while tin cans are liable to get bent, cans made from leatheroid are entirely free from this objection. They have the elasticity of thin steel, and no amount of kicking or hauling will break them. Orders have already been received from several large mills for their roving cans and boxes, which are made seamless. This substance is also used for covering pulleys to a large extent, making one of the smoothest and most lasting coverings which can be obtained.

WHEAT AND CORN STATEMENT FOR NINE YEARS.—S. W. Talmage, of Milwaukee, sends the following statement of the wheat and corn production in this country from 1872 to 1881 inclusive, also the average annual production, and the estimated production for 1872:

Year.	Wheat, bu.	Corn, bu.
1872	249,997,100	1,092,719,000
1873	281,254,700	932,274 000
1874	309,102,700	850,158,500
1875	292,136,000	1,331,069,900
1876	289,356,500	1,283,827,000
1877	364,194,100	1,342,558,000
1878	420,122,400	1,388.218,700
1879	448,755,118	1,547,901,800
1880	498,549,723	1,717,434,500
1881	380,280,100	1,194,916,000
Average production:		
Wheat, bu		352,604,844
Corn, bu		1,267,106,650
Estimated production for 1882:		
Wheat, bu		525,000,000
Corn, bu		1,800,000,000

TWO MONTHS ago Mr. Keely, the inventor of the celebrated Keely motor, began, by order of court, to reveal to Mr. Boekel, the secret of his invention. After seven weeks constant revelation, Mr. Boekel declares that he does not yet understand it, and is inclined to think that "recognized mechanical sciences cannot reach the thing." This must be very disappointing not only to the stockholders, but to Mr. Keely himself, who has announced his intention of taking out a patent. It would obviously be impossible to patent a process or invention which could not be explained or described, for the law requires description for the purpose of identification. Mr. Keely may raise the point that the constitution of Mr. Boekel's mind makes successful revelation to him impossible, and might insist on the appointment of some new person as the depositary of the secret. But the probability is that the Keely secret will long remain one of the mysteries of science.

WOODEN BOLTS IN HOUSE BUILDING.—The Exeter, England, *Flying Post* offers the following: "Why do you make so lavish a use of nails in the carpenter's work of our houses, to the exclusion of the honest old oaken pin? Pull down any building, if it be merely a barn, of more than 200 years old, and you will not find a single nail in the original work; rafters and joists were all bolted together so stoutly as almost to defy the tools of the destroyer. Many an old manor barn, when pulled down of late years—as unfortunately only too many of them have been—has shown itself to have been better built than most palaces are now. There are arguments in the way of economy of time and so on in favor of the use of nails in house building, but they are as nothing compared with the solid advantages of using wooden bolts. The iron nails in time canker and rot rafters and floors, but bolts hold them together 'like grim death,' and render a house practically indestructible.

ALMOST PERPETUAL MOTION.—A New York paper reports that there is on exhibition in a small apartment in Chambers street, what is claimed to be the nearest approach to a perpetual motion ever devised. The contrivance consists of two wheels, nearly concentric, which are rotated by means of nine four pound balls, which run in the grooved radie of the wheels. When the machine is at rest, four of the balls are placed in the grooves of each of the wheels, one to each of the four grooves, there being seven in all. To give motion to the machine a ninth ball is placed in a vacant groove. The equilibrium being disturbed, the first wheel begins to revolve, and the movement of its axis, which is cogged with the axis of the other, and sets that in motion. On reaching a certain point the odd ball instead of continuing its motion from the center of the wheel to the circumference, rolls through an opening into a groove belonging to the companion wheel and imparts additional motion to that one, the loss of force in the first being soon made up by the return of the odd ball on reaching a given point on the other side.

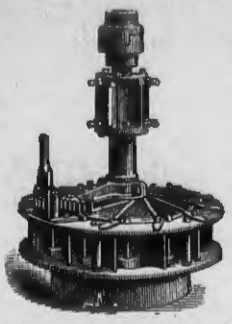
The machine does not generate much power, but it certainly develops enough by simple gravitation to give motion to itself until the material of which it is made is worn out. It is the invention of Albert Pietrowski, a Polish engineer, who labored for more than eighteen years before he succeeded in perfecting a model that would satisfactorily demonstrate the theory which had been the dream of his life.

MEASUREMENTS OF THE GREAT LAKES.—The following measurements of the great lakes have been taken by government surveyors: The greatest length of Lake Superior is 335 miles; its greatest breadth is 160 miles; mean depth, 688 feet; elevation, 827 feet; area, 82,000 square miles. The greatest length of Lake Michigan is 300 miles; its gratest breadth, 108 miles; mean depth, 690 feet; elevation, 506 feet; area, 23,000 square miles. The greatest length of Lake Huron is 300 miles; its greatest breadth is 60 miles; mean depth, 600 feet; elevation, 274 feet; area, 20,000 square miles. The greatest length of Lake Erie is 250 miles; its greatest breadth is 80 miles; its mean depth is 84 feet; elevation, 261 feet; area, 6,000 square miles. The greatest length of Lake Ontario is 180 miles; its greatest breadth is 65 miles; its mean depth is 500 feet; elevation, 261 feet; area, 6,000 square miles. The total of all five is, 1,265 miles, covering an area of upward of 135,000 square miles.

"COAL BY WIRE."—An article is going the rounds of the press with the very taking title of "Coal by Wire." It is an outgrowth of speculation upon the possibilities of the dynamo of the future. The gist of the article is this: That, by utilizing the immense water powers of various parts of the globe in driving dynamos, the power may be sent as electricity over comparatively small copper conductors to any point where it is desired to use it. This, of course, will do away with the necessity for the transportation of coal. It would also be possible to utilize the coal at the mines in driving engines, the profit, in that case, coming from cheap coal and the saving in its transportation. The possibilities of new combinations which the dynamo presents are so great, and our knowledge of its limitations so comparatively small, that the imagination is prone to run riot. At present we must wait for improved forms of dynamos, for there is too great a percentage of loss to allow us to introduce them, into any and every situation where transmission of power may be desirable. —*Iron Age.*

A BROKEN SHAFT.—There was a loud report at 11 A. M. on August 13, the top story of one of the New York Central railway grain elevators at the foot of West sixty-fifth street, New York City. The building shook to its foundations, and fire flew from the floors at the holes through which the big belt that runs the machinery passes. The elevator is the one known as A. It is 350 feet long and 145 feet high. Two powerful engines in the basement turn a large driving wheel, over which passes a rubber belt that also passes around a shafting wheel in the top story nearly 150 feet above. The belt is 350 feet long, and weighs three tons. The shafting wheel which it turns weighs four tons, and connects with a horizontal shaft of cast steel, seven inches in diameter, that runs from one end of the big building to the other. It was the snapping of this shaft that caused the commotion of Tuesday. The shaft broke off at the hub of the shafting wheel, which was thrown off its center with a violence that made the building tremble. The shaft itself nearly all along its length was bent and twisted. Fortunately, the belt slipped from the displaced wheel, and further motion was stopped. Had the belt remained in place the wheel would have been torn off, in which case it would have crushed through the floors to the basement. The great velocity with which the machinery was moving is shown by the fact that when the snapping of the shaft caused the belt to touch the side of the opening in the several floors through which it passed, the friction produced flame. Had the heavy wheel fallen through the building, great loss of life would have resulted, in addition to the damage to property. As it was, it will require an expense of several thousands of dollars and a fortnight time, which means the loss of thousands more, to repair the shaft.

THE branch office of the Link Belt Machinery Company have recently booked a $5,000 order from the South St. Louis Elevator Company; an $800 order from N. O. Nelson, city; a large order from the Anchor Milling Company, and one from the Osborne Machinery Company for 800,000 feet of belting. The Link Belt Machinery Company since the first introduction of their belting to the public, have sold, all told, between 28,000,000 and 30,000,000 feet of it.



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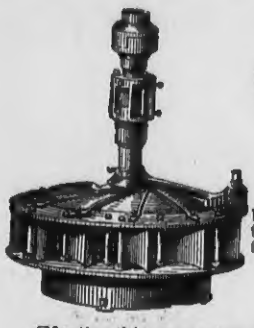

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The AMERICAN TURBINE, as recently improved, is unequaled in the power utilized from a given quantity of water, and is decidedly the BEST "PART GATE" Water Wheel ever known. It has also been otherwise greatly improved.

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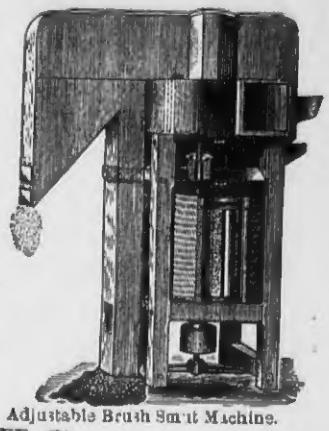
RICHMOND'S CELEBRATED

Smut Machines,
Brush Machines,
Grain Separators,
and Bran Dusters.



Adjustable Brush Smut Machine.

Nearly Two Hundred of these Machines are now in operation in the city of Minneapolis, Minn., alone, and more than sixty in the city of Milwaukee, Wis. They are also extensively used in many other sections, both on Winter and Spring Wheat.

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CAWKER'S
AMERICAN FLOUR MILL DIRECTORY
FOR 1882:

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Of Flour Mill Owners in the UNITED STATES and CANADA.

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We have the BEST GATE in EXISTENCE and by it the most Direct Efficient Applications of the Water to the Wheel.

MEDAL & PREMIUM AWARDED TO
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Most Perfect Turbine in Use.

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The Wheel is STRONG, DURABLE AND EFFECTIVE. Unsurpassed in Power at "part gate." Warranted to give full satisfaction.

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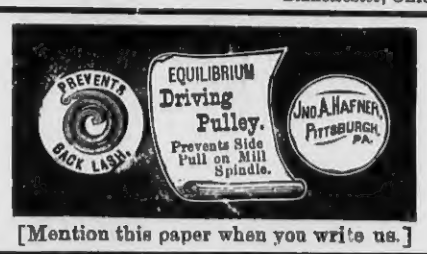

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Leather, Rubber, Canvas Belting and Bolts at lowest market rates. We have no traveling agents. Sample Buckets sent on application. Large orders will receive liberal discounts. Send for sample order.

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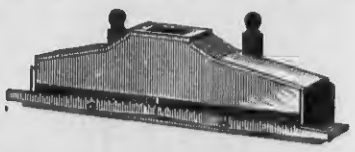

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MILL STONES.
Flouring Mill Contractors.
Send for Pamphlet.
Nordyke & Marmon Co
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NORDYKE & MARMON CO,
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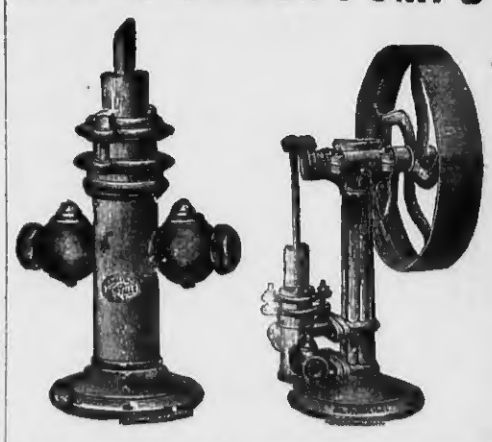

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MILL PICKS!

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IT PURIFIES MIDDLINGS

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LOW IN PRICE,

Quantity and Quality of Work Considered.

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Adapted to all Systems

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Single, Double and Special Machines.

Durable, Light Running.

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THE SMITH PURIFIER is in Use in every Milling Country in the World. More than Four Thousand are now running in the United States.

The Smith Purifier has a Positive and Effective Means of Cleaning the Silk of the Sieve. **The Smith Purifier** has Graded, Controllable Air Currents. **It is Impossible** to do Good and Economical Work without these Features.

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Makes it both convenient and easy to keep the Silk always properly stretched.

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REDFIELD'S COMBINED ELEVATOR AND PURIFIER!

Why these Purifiers are Such Favorites Wherever Introduced.

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6. Are more readily adjusted to different kinds of middlings.
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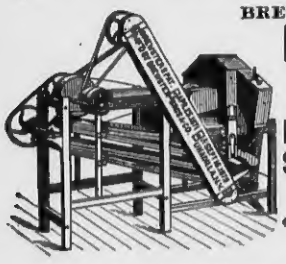

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Is the only Machine whereby the greatest yields of

PURE, WHITE, SHARP FLOUR

can be obtained.

The only reliable, practical and durable Machine

IN THE WORLD.

The Positive Adjustment AND AUTOMATIC

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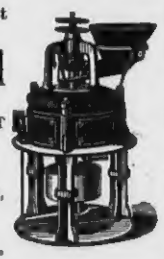
Is strictly Self Protecting,

The **BEST ADJUSTMENT IN THE WORLD,** And the only **PERFECT GRANULATOR,** GRINDS COOL, SELF OILING, GREAT SAVING OF POWER,

SIMPLICITY AND Durability Combined.



Satisfaction Guaranteed on all our Goods. Send for descriptive Circular, giving Prices, Sizes, Terms, etc.

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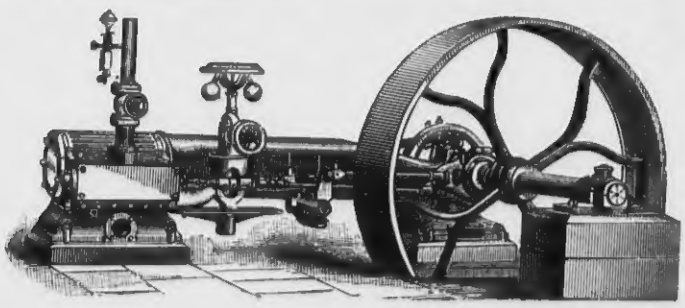

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Mill Irons, Belting, Mill Picks, Iron Proof Staffs, Smut Machines, Elevator Cups, and

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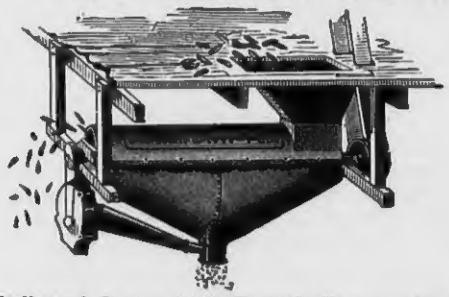

Shells and Cleans 2,000 Bushels Ears per Day.

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THE PAIGE MFG. CO., Painesville, Ohio.

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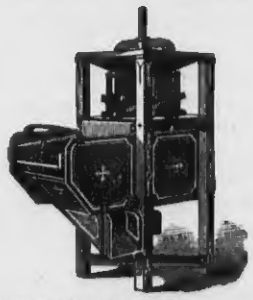

The only Self-Adjusting Sheller in use that will

SHELL MIXED CORN,

FAST AND WELL,

And that will clean it THOROUGHLY.

Easy of access to all parts liable to clog. Thoroughly made. Sold as cheap as the cheapest.

Send for circulars to

G. MARSHALL & SON,

Founders and Machinists and Manufacturers of Marshall's Rotary Force Pump. Improved Jonval Turbine Water Wheel, etc.

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AMSTERDAM (Holland), Europe,

Telegrams, OROBIO, Amsterdam,

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FLOUR and GRAIN.

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John H. Miller,

MANUFACTURER OF

MILLER'S COMPOSITION

MILL BUHR RUBBER,

SECTIONAL FURROW GAUGES AND STAFF.

PETERSBURGH, HUNTINGDON CO., PA.

The Best, Cheapest, and Most Durable Rubber in the Market, USED DRY. Will outwear any Rubber made in the world, and retain its cutting qualities until entirely worn out.

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N. B.—*This Rubber will not wear a pair of Buhrs out of existence in 15 minutes.* But if used in connection with the Pick and Red Staff will leave the face and Furrows in the best possible condition for making good work. For cleansing the face of Glazing it has no equal. Try it and be convinced. Money refunded if not satisfactory.

☞ Mention U S. Miller when you write to me.

Do You Want a Head Miller.

I offer my services to any millowner desiring to employ a miller to take charge of a NEW PROCESS MILL—Roller Mill preferred. Can furnish the best of references from some of the best Mills in the country, having occupied the position of Head Miller for twelve years.

Address for further correspondence:

X Y Z. Care of UNITED STATES MILLER, Milwaukee, Wis.

(*Continued from page 69.*)

method is to split the berry through the crease, which action therefore performs the double function of freeing the dust and loosening the germ. As we have shown, rolls cannot be made to break the wheat in this desirable manner, but that their action in the first reduction breaks it into pieces of irregular shape, thus permitting the germ to adhere to much of these groats or kernel pieces. The result is that the germ is liable, like the bran, to be partially comminuted, and to make its appearance among the middlings and break flour at every stage of the reduction instead of being removed at the start, as it should be. There is no better or safer principle to be followed in milling than that impurities should be removed as quickly as possible. The reason for such a principle is simple enough and need not be dwelt upon; and it is certain that this principle will ever be a guiding one to thoughtful millers until some better means than bolting cloth for separating impurities is discovered. So long as separations are made according to the size of particles, and no means exist of removing dust or impurities of the same size as the flour particles, just so long must the miller prevent, as far as possible, the reduction of impurities and their mingling with the flour. On this ground it is safe to reject rolls entirely for the reduction of the wheat. Their action interferes with principles in milling which are recognized as sound. It was not denied until recently but that rollers could not remove the dust in the crease. One firm of roll-makers in America went so far as to deny that there was dirt in the crease at all. This denial, so utterly at variance with what every miller knew to be the case, met with such a reception that these same roll-makers soon after claimed that their rolls would take out the dirt whose existence they had firmly denied.

The very nature of the roll's action which renders it objectionable as a means of reducing wheat to middlings, renders it invaluable for another purpose. The squeezing action of the smooth roll is the best means that has yet been discovered of flattening the germ in middlings. So, too, rolls may be appropriately used for breaking down coarse middlings, and for cleaning bran a finely corrugated roll is one of the best means yet devised. Nor are rolls of porcelain objectionable for grinding coarse of medium middlings, though the millstone, properly dressed and driven, is claimed by many to be better for this purpose than either porcelain or chilled iron rolls Still, it is not so great a mistake to use rolls for reducing middlings as it is to employ them for reducing wheat. Properly used, and applied with reference to its true capabilities, the roll is a valuable accession to the machinery of the modern mill; but a true perception of its character as a machine would never apply corrugated rolls to the reduction of wheat. One of your most prominent and experienced milling engineers, and a strong advocate of roller mills for reducing wheat, stated publicly a few evenings since, that "the breaking of wheat by fluted rollers is not yet done perfectly." And why, let me ask, after being in use for so many years, are they not made to do perfect work? Surely there can be but one answer, and that is that they are not adapted to such work.

It has been repeatedly urged that a mill running on a complete roller system can never "finish up;" and it must be confessed that the objection is a valid and true one. There is always a residuum of material or tailings, "ueberschlag," as the Germans call it, made by the corrugated rolls themselves, which the miller barely knows what to do with. The perplexity in which he finds himself leads him, as a rule, to expand his "system," adding more breaks and reductions, in the hope of finishing up better. In the end the miller generally resorts to some of his disused millstones for the finer stuff, and possibly wishes that there was some apparent finishing point in a system of reduction by rollers alone.

And now, gentlemen, I will call your attention specifically to

THE JONATHAN MILLS REDUCTION SYSTEM,

which is pre-eminently an American invention and founded on scientific principles, and simple and practical in all its details. The Degerminator and Reduction Machine, invented by Mr. Jonathan Mills, are of all gradual reduction appliances yet brought out, the only machines which were designed for a single specific purpose.

While millstones and rolls have been applied promiscuously for every purpose in Gradual Reduction Milling, these machines were designed specially to reduce wheat to middlings, with the further purpose of accomplishing this without incorporating either seam impurities, germ or pulverised bran in the break or wheat flour made in the operation. I think it must be acknowledged that this is an ample amount of work for one class of machines to do. The inventor might, by certain modifications, have adapted his machines to flour and cleansing the bran; at least he might have employed them for further purposes with as much success and fitness as is found in cases where either rolls or millstones are used alone for these three widely different objects. But he did not make any such attempt, contenting himself with adapting his machines to the specific purpose of reducing wheat to middlings. This fact renders a judgment as to the merits of these machines a comparatively easy matter; for we have only to judge of the adaptability of the means to one end, instead of half a dozen.

We have already seen that the objects to be sought in reducing wheat to middlings are substantially: First. The largest possible production of middlings. 2nd. The removal of seam impurities and the germ at the earliest possible stage in the operation so that they will not discolor the break flour; and, 3rd. The avoidance of pulverising the bran at each and every stage in the transforming of the wheat into middlings.

We have seen that if these conditions are complied with, the wheat flour must necessarily be of a high quality, and but little inferior to the "patent." A machine or system which can make a large percentage of middlings and at the same time keep all the crease-dust, germ and fine particles of bran out of the break or wheat flour, is exactly the machine or system which meets all the requirements of the case. It may be noted in this connection that a machine which will not grind up or comminute the bran and germ must, from the very nature of the case, other things being equal, make the largest percentage of middlings; for the very qualities in the machine which would reduce bran and germ would also reduce the interior p rt of the wheat kernel to flour.

(*To be continued.*)

Prepared Foods.

The following facts are taken from a recent number of Bradstreet's Journal: The use of prepared foods has become universal. A half a century condensed foods may be broadly classified thus: 1. Hermetically sealed, or canned foods. 2. Desicated and dried foods. 3. Steam-cooked condensed foods. 4. Extracts of beef, mutton, vegetables and fruits—or concentrated foods. This grouping also indicates the relative consumption, beginning with canned goods as the highest. Practically, all things edible in the animal and vegetable kingdoms are now canned. Desicated and artificially-dried vegetables and fruits are in great variety, and embrace equally the products of temperate and torrid zones. Condensed foods cover the cereals fit for table use, and milk, eggs, coffee and chocolate. Extracts of beef and mutton, oftentimes in combination with fruits, are principally used in hospitals and by invalids, although a well-known extract of beef is largely used in hotels and restaurants for making choice soups. It will readily be seen that the commercial value of the preparations contained in the four classes named is very great.

The United States, with its vast productiveness, is foremost as the world's supplier of prepared foods, and goods of American origin may be found at the remotest points of the two hemispheres. In the Western States and on the Pacific coast the trade in canned goods is enormous. The bulk of the food supply of a prospector, a miner or a train comprises bacon, flour or canned goods, the latter usually exceeding in value the two former. The trade in prepared foods with the Pacific coast is an exchangeable one, there being several extensive canneries there, and great quantities of canned fruits and salmon are shipped from there. The home supply on the Pacific coast is lacking in oysters, fowls, condensed milk, pineapples, meats and soups. Peaches, tomatoes and other lines fall short at times.

Unfortunately no reliable statistics exist, nor can a just approximation be made of goods in the United Staates. Taking as examples four of the most notable products canned, and of which an approximately correct exhibit is attainable, an idea may be formed of the immensity of the trade. Over 8,500,000 bushels of oysters are annually canned. Of this, 5,000,000 bushels are packed raw, and 3,500,000 bushels cooked and hermetically sealed. There are 176 oysters in a bushel, and at the rate given there are canned each year 30 oysters for every inhabitant of the United States. This requires 10,500 vessels and employs 50,000 persons. The Total amount of capital invested is $10,000,000, and the wages earned are $9,000,000 in round numbers. The pack of salmon on the Pacific coast for 1881 was 861,393 cases, or 43,000,000 pounds.

The annual pack of tomatoes is a large one reaching a total in the United States of 1,500,000 cases, or 63,000,000 pounds, valued at $3,300,000. The table below gives the pack by States:

	Cases.
New Jersey	500,000
Maryland	300,000
Delaware	180,000
New York	155,000
Massachusetts	100,000
Ohio	75,000
California	50,000
Connecticut	40,000
Pennsylvania, Virginia and Western States	100,000
Total	1,500,000

There is a large trade in corn, and the yearly pack quite curiously is estimated at the same figures as tomatoes, or 1,500,000 cases.

The profit to the packer for putting up and marketing his goods is from three cents to five cents a can; the grocer has a fair margin of profit, yet the consumer can buy canned goods ready for the table as cheaply as he can buy raw and prepare them. Therefore it may be said that the industry is in only the first throes of its expansion.

Steam-cooked condensed foods, products cooked by steam and by subjecting to great pressure, or by evaporating, feed from all traces of water, are yet in the era of development. Enthusiastic exploiters in this new field of industry state that in the near future all kinds of watery foods will be sold in a condensed form, and to a great extent supersede other preparations. Eggs and milk have already been successfully reduced to a powder, and the different cereals to a minimum bulk. By simply adding hot water to condensed foods, they are returned to a state approaching nature, and are ready for use in cooking or for the table. In the transportation and storage of these goods, the reduction in bulk caused by condensation is of great advantage and profit to the dealer. Their advantage to the housekeeper are obvious. That in time a family's provisions for a week may be carried in a bandbox is not an extravagant prediction.

The commercial value of concentrated foods largely depends upon their value to pharmacology. Valentine's meat juice and the various English meat juices are extracted by pressure, no chemi al manipulation being used. Their components are: Ninety parts water, seven parts albumen and compounds, three parts organic salts, soluble and insoluble. Borden's beef preparation is extracted by superheated steam and evaporated to dryness. It contains all the elements of beef tissue. It shows fifty-five parts water, thirty parts animal gelatine, ten parts albumen and its compounds, five parts organic salts, soluble and insoluble.

The above extracts are classed as nutriments. Liebig's extract of beef contains inosin, inosinic acid, musculin, osurazome and various organic salts, embracing common salt, a trace; potassium, a trace, left by using potash for maceration, and magnesia in combination with phosphoric acid. Its components are sixty parts water, thirty-six parts organic and soluble matter, and four parts insoluble matter. It is extracted by chemical manipulation in vacuum, and is classed as a stimulant.

From an economical view, the use of prepared foods is a saving to the farmer, merchant and consumer. It enables the former to dispose of his entire crop at one deal and at a fair price, thus preventing the loss of produce and time which accrues when crops are handled and sold in small lots. The merchant saves storeroom, freightage, packing and clerk hire. The consumer saves time, fuel and help. The refuse of meats, vegetables and fruits is all utilized at the canneries, even to the cherry-pits; whereas had the same food been prepared by families, the refuse would have been wasted in the ash-heaps. And this saving costs the merchant and consumer nothing, because the buying of produce and the work of preparation can be done cheaper by well-ordered labor combinations than by individuals. Old cans are even turned into use; the trunk manufactures pay a good price for them, and stamp them into ornaments for their wares. — *Manufacturer's Gazette.*

The Horse Power of Turbines.

The power of water is its weight multiplied by the velocity, and in order to illustrate we will suppose a turbine wheel, working under 15 feet head, will discharge 3,168 cubic feet of water per minute, and utilize 80 per cent. of the full power of the water. Multiply the cubic feet discharged per minute by 62½, which is the number of pounds each cubic foot of water weighs at the average temperature, and this product by height of head under which the wheels are working, and that product divided by 33,000 pounds, this number of pounds raised one foot high in one minute being one horse power, which will give the full horse power of 3,168 cubic feet per minute, under 15 feet head; and as no wheel will produce 100 per cent., the percentage the wheel in question is known to produce or utilize, must be taken as the actual horse power, as in the example here given:

3168 cubic feet per minute.
62½ weight of 1 cubic foot.

1056
6336
19008

197472 full weight of water.
15 feet head.

987360
197472

83000)2962080(89.76 full value of water
264000 80 per cent. utilized.

322080 71.8080 net horse power,
297000 (or 80 per cent. of the full power of water

250800
231000

1980 0
198000

It will be seen that the effective horse power at 80 pr cent. of the full value of the water is 71.80. We will now suppose the wheel had only utilized 60 per cent., then multiply the full value, 89.76, by 60, and the horse power would be 54.55. If the wheel would utilize 75 pr cent., the effective horse power would be 67.32. From the explanation and example given it can easily be ascertained what number of horse power any weeel will produce, with a given number of cubic feet of water per minute, on any head, provided the percentage the wheel in question will utilize is known.

Late Items.

Frank M. Luckhart, of Xenia, Ohio, is putting in a Victor Turbine.

L. Meeker, Evansville, Minn., has ordered a 25 inch Victor Turbine.

THE Mauline Paper Co., of Mauline, N. Y., are now using the Victor Turbine.

THE Andrew Coggin Pulp Co., of Portland, Maine, have ordered a 25 inch Victor Turbine.

THE Mt. Holly Paper Co., of Mt. Holly Springs, Pa., have just put in a Victor Turbine

THE S. & B. Mfg. Co. are building two 44-inch Victor Turbines for Sidney Brown, Ogdensburg, N. Y.

Ackley Stone & Parks have just ordered two large Victors to run their flouring mill at Oconomowoc, Wis.

A 10-inch Victor Turbine furnishes the entire power (over 100 horse-power) for the pulp mill at Naples, N. Y.

W. H. & D. F. Peuse, Germantown, Ky., have ordered a 35 inch Victor Water Wheel of the S. & B. Mfg. Co.

THE S. & B. Mfg. Co., Dayton, O., are building a 25 inch Victor Turbine for C. E. Spencer & Co., Ashton, D. T.

THE new water works at Appleton, Wis., will be furnished power by the Victor Turbine 25 and 30 inches in diameter.

THE Victor Turbine and a full line of Odell Rolls are to be placed in the mill of Coombs & Greenwald, Coldwater, Mich.

THE S. & B. Mfg. Co, have orders for 5 Victor Turbines to go into the new paper mills of the Patten Paper Co., at Neenah, Wis.

W. H. Dorwin, Durand, Wis., has placed his order with the Stilwell & Bierce Mfg. Co. for a Victor Turbine and Odell Roller Mills.

THE Springdale Paper Co., Springfield, Mass., are putting in Victor Turbine 10 inches in diameter, which is to give 100 horse-power.

THE Ottawa File Works, at Ottawa, Ill., are so well pleased with the Victor Turbine they are now using, that they have just ordered another.

THE S. & B. Mfg. Co., of Dayton, Ohio, are now building 3 of their largest sized Victor Turbines, to drive the pulp mill of A. W. Priest, Kaukauka, Wis.

THE S. & B. Mfg. Co. have just shipped a 30 inch Victor Turbine to John Russell, Valley City, Dakota. The mill of Hiram O. Walker of the same place, is driven by the Victor.

THE Merreton Cotton Mill Co., of Merretton, Ont., desiring to get the best, have placed their order with the S. & B. Mfg. Co., Dayton, O., for 3 large sized Victor Turbines for their new mill.

THE Sebago Wood Board Co., of Portland, Maine, have 5 Victor Turbines now in use, and are so highly pleased with them that they have ordered 5 more of the builders, Stilwell & Bierce Mfg. Co., Dayton, Ohio.

THE Victor Turbine is in successfull operation in many foreign countries, and its fame is spreading. The makers, Stilwell & Bierce Mfg. Co., Dayton, Ohio, have just shipped wheels to England, France, New Zealand and other countries.

AMONG the recent orders for the celebrated Turbine Water Wheels are the following, viz. The Wiley Construction Co., Greenfield, Mass.; Chisholm Bros. & Gunn, Minneapolis, Minn. Fred. Nell, London, England; Richmond City Mill Works, Richmond, Ind.; Alfred Dodge Dodgeville. N. Y.; Aron Mfg. Co., Lewiston, Maine; The. John T. Noye Co., Buffalo, N. Y.; A. Plamondon Mfg. Co., Chicago, Ill.; Mt. Vernon Mills Co., New York City; Pelham Mills Co. Greenville, S. C.; J. S. Graham & Co., Rochester N. Y.; Hanover Mfg. Co., Hanover, Ill.; Hardesty Bros., Canal Doree, O., and many others.

Setting of Eternally Fired Cylinder Boilers.

A very common and cheap mode of setting horizontal, externally fired cylinder boilers employs straight walls only at the end, the back end having a horizontal cast-iron plate or bracket riveted to it, by which it is upheld by the rear wall of the brick setting. The plate arrangement is better than arching over the rear ends, as in the case of tubular boilers the rear ends of the tubes are quickly and readily accessible and seen under good light for examination of repairs. Still the arch offers the best passage for the gases of combustion. Bricks are better than stone for foundations. Brick walls are much better hollow (that is, of two single thicknesses with an air space between them) than solid. The walls are carried up straight to the level of the top of the shell, and filled in with some good non-conducting material, either solid or filled with air spaces, the latter being far preferable. A mixture of sawdust, coal ashes (not wood) and plaster of Paris, makes a good insultator. It should not touch the iron boiler shell, but be separated from it by a wooden lagging, made by kerfing out strips an inch thick, four inches wide, and long enough to reach over and around the upper semi-circumference of the shell, and building up the arch (by narrow board strips) laid on these arches which latter are about three or four feet apart, and hold the boards off from the shell and leave an air space. It would, perhaps, be about as well to cut these longitudinal strips into lengths equal to the distance between centres of the arched bearers, so that sections of three or four feet in length of the board lagging may be removed at will. Every precaution which facilitates ready examination is valuable and desirable. To carry out this idea more completely, the writer has devised a mode of making the non-conducting covering or plaster, in readily removable sections. This is to lay on top of the board lagging, before "grouting" with the plaster, some lengths of wire which hug the lagging closely, their ends coming up at the sides, so that when the plaster begins to set, these wires may be used to cut it into blocks, any one of which may be removed without disturbing the others. All the lengthwise wire may be laid down first, and then all the cross wires; they being removed in the reverse order. Sand should never be used, either wholly or in part, for this filling. It is best to cover the top of it with a stout canvas, which will prevent the percolation of water through the joints and consequent rusting of the outer surface of the plates. Where a brick arch is used, it should not be allowed to touch the boiler shell, especially if the joints be made with lime mortar. But the use of lime mortar in boiler setting cannot be too strongly condemned. In the furnace proper, fire-clay should be used to make the joints of the first brick there necessary. Some shells are upheld by cast-iron lugs rivited to the shell at its medium line. They should correspond accurately to the curve of the shell, and be of suitable braced shape in order that they may not crack or give way. In a twelve-foot boiler four are necessary, two on each side, they should be placed three feet from each end. Sometimes, to allow for expansion and contraction in length, the rear end is left to be supported on rollers, instead of being hung by the lugs. The same object would be attained by setting a plate in the brick work under each rear lug and putting a roller between it and the lug. The plate should extend a little further back than the lug, and there should be a brick abutment at each end to keep the roller in place. A crop end of one-half-inch shafting would make an excellent roller. It must be remembered that the expansion and contraction of a boiler, unless allowed for (no earthly arrangement will prevent it), will surely break up and destroy any setting. When a muddrum is used (and it is generally desirable to have one, say one-third the diameter of the boiler shell, and fitted with a man-hole as well as with blow-offs), it may extend either across the under side of the boiler, forming a support for the rear end, or it may run lengthwise and its head project through the rear wall. The walls heretofore referred to are for supporting the shell. There are others built across to form furnace and ash pit. The first from the front end is the bridge wall, which is peculiarly subject to destruction by the fierce heat playing around it. It should be of special thickness (preferably hollow), and faced with fire bricks. The fire-brick furnace walls should be brought up to the water line. The grates have a rest of about an inch in the bridge wall plate, and on a bearing bar fastened in the fire brick. They are generally slightly the lowest at the rear end, to facilitate stoking. As regards distance from the under side of the boiler, it should be regulated strictly by the kind of fuel. Many a time a new lot of good coal has been unjustly condemned as poor for steaming purposes, when it was simply unadapted for the grate, or the fire-box too high or too low—*generally too high*. For hard anthracite, eighteen inches is sufficient fire-box height, twenty-four inches for semi-bituminous, and thirty inches for bituminous coal proper. In a twelve-foot boiler, forty-eight inches in diameter, good usage sanctions the following dimensions and distances:

	Inches.
Height of centre line from ground	
Height of lower end of grate from ground	varies
Length of grate, net	66
Distance from top of grate to bottom of boiler	varies
Thickness of boiler wall and mud-drum wall (if solid)	16
From centre of bridge wall to centre of mud-drum wall	64
Thickness of back cross wall { top	8
Thickness of back cross wall { bottom	19
Distauce of centre of rear wall from centre of back cross wall	29
Thickness of rear wall	18
Height of rear cross wall	51
Height of mud-drum wall	varies
Depth foundation walls below ground level	44
Thickness of side wal's, if solid	38
Side walls, out to out	88
Side walls, in to in	57

The boiler should be slightly inclined (say one inch in ten feet) toward the blow-off pipe at the back end, and this should be so placed as to drain the boiler dry if needed. Long boilers should not be hung from three points; for, as they are heated more at the bottom than on the top, they will be expanded more on the bottom than on the top, and the ends will be thrown up, thus putting most of the weight upon the middle support.—*Eiller, Millwright and Millfurnisher.*

NEWS.

The mill at Iuka, Ill., owned by Collins Bros., is being remodeled.

A 25,000 bushel elevator is being built at Lapelle, Ind., for J. T. Ford & Co.

A new mill is being erected at Pike's Peak, Ind., by Soffel & Bartholemew.

A three-run water mill is being built at Athens, Ala., for James Owens.

A flouring mill is being built on Kent Island, off the coast of Maryland, for John Phillips.

The Minneapolis Board of Trade have selected a site and will erect at once a $150,000 building.

S. A. Ellis, of Grafton, Neb., is commencing the erection of a 125-barrel gradual reduction mill.

Messrs. E. P. Allis & Co. have the order for rolls from Messrs. Bierbauer & Co., Fillmore, Minn.

Isaac Johnson, of Randolph, Iowa, is remodeling his mill so as to embace late improvements in milling.

Messrs. Griggs, McCormick & Grosvenor have just completed their new roller mill at Grand Forks, Dak.

Dr. Barrett, of Harrisonville, Mo., is altering his mill to the roller system. The capacity will be 125 barrels.

A new mill is being built at Old Town N. C., for L. J. Him, by Nordyke & Marmon Co., of Indianapolis, Ind.

C. A. Hege, of Salem, N. C., has ordered a two-run mill of Nordyke & Marmon Co., of Indianapolis, Ind.

Messrs. Plank Bros., Wooster, O. have ordered a double roller mill with Gray's Patent Frame of Edw. P. Allis & Co.

C. A. Smith, Lebanon, Mo. has ordered a double Gray's Patent Roller Mill of E. P. Allis & Co., Milwaukee, Wis.

Stephen Appel, Theilmanton, Minn., is putting in a line of rolls and other machinery from E. P. Allis & Co., Milwaukee, Wis.

Perry Hutchinson's new mill at Marysville, Kas., has started up on the new crop. It is one of the best mills in Kansas.

A 200-barrel mill intended for the manufacture of hominy, pearl grits and corn flour is being erected at Henderson, Ky.

Messrs. Edw. P. Allis & Co. have recently shipped one of Gray's double roller mills to D. B. Sears & Son, Rock Island, Ills.

John Kull, of Stanton, Ill., is repairing his mill and has bought a Becker Wheat Brush of the Eureka Mfg. Co., of Rock Falls, Ill.

Hanzel & Novak, of Schuyler, Neb., are well pleased with the Becker Brush bought of the Eureka Mfg. Co., of Rock Falls, Ill.

E. F. Porter & Bro., of Table Grove, Ill., just sent in their order to the Eureka Mfg. Co., of Rock Falls, Ill., for a Becker Brush.

D. S. Lowe, of Sullivan, Ill., has just placed his orders for a Becker Wheat Brush made by the Eureka Mfg. Co., of Rock Falls, Ill.

The Yeager Mill Co., of Kane, Ill., are putting in a first and second reduction of the Case Little Giant Break Machines.

Currie & Watson, Ada, Mich., have put in one of Gray's Noiseless Belted Roller Mills, manufactured by E. P. Allis & Co., Milwaukee, Wis.

Messrs. Lukens & North, Atchison, Kas., are putting in a double porcelain roller mill furnished by E. P. Allis & Co., Milwaukee, Wis.

A. M. Robinson, of Fillmore, Ind., is building a three-run mill, using machinery made by Nordyke & Mormon Co., of Indianapolis, Ind.

Valentine Miller, Iowa City, Iowa, has recently added to his milling outfit one of Gray's Patent Belted Noiseless Roller Mills with two pairs of Allis' Rolls.

Messrs. Chisholm Bros. & Gunn, Chicago, have just ordered of Mess. Edw. P. Allis & Co., sixteen pairs of Allis Rolls in Gray's Noiseless Belted Frames.

Messrs. Wilford & Northway, Minneapolis, have placed their orders with Messrs. E. P. Allis & Co. for 4 pairs of Allis Rolls in Gray's Patent Belted Frames.

The Brass Foundry & Machine Works, Fort Wayne, Ind, are placing a large number of Gray's Patent Belted Roller Mills, furnished by E. P. Allis & Co.

Messrs. Stratton, Merrill & Co., Concord, N. H., have ordered nine pairs of Porcelain Rolls in Gray's Patent Noiseless Frames for their new mill at Fisherville.

Licking, Mo., will soon be furnished with a first-class new process flouring mill. Cravins & Campbell of that place, after visiting various establishments, have contracted with Nordyke & Marmon Co., of Indianapolis, Ind., for the necessary machinery.

The Lenoir Manfg. Co., Lenoir, Tenn., have ordered a double porcelain roller mill with Gray's Patent Frames of Messrs. Edw. P. Allis & Co.

Messrs. Smith, Stratton, Gifford & Co., Nashville, Tenn, are putting in a full line of rolls in Gray's Patent Frames of Messrs. Edw. P. Allis & Co.

Henry Darnell, of Masonville, N. J., wanted a Becker Brush so badly that he sends cash with the order, and says he wants a Becker Brush or none.

May, Weber & Co., Watertown, Wis., have recently ordered another double roller mill in Gray's Patent Belted Frame of Messrs. Edw. P. Allis & Co.

A. G. Mowbray, Supt. of the Union Mill Co., Winona, Minn., has ordered the second break machine of the Case Mfg. Co. for their new mill at Stockton.

Thomas Armour, of Emporia, Kansas, and Lukens, of North Atchison, Kansas, have each ordered a break machine, "Little Giants", of the Case Mfg. Co.

The Case Mfg. Co., of Columbus, O., have just shipped C. F. Hobart, Spearfish, Dakota, a line of their goods consisting of break machines, rolls, purifier, reels, etc.

Kalahan & Hudgens will built a two-run mill at Whitesboro, Tex. in which they will use machinery manufactured by Nordyke & Marmon Co., of Indianapolis, Ind.

Messrs. John Stolz & Co., Pekin, Ills., will remodel their mill to the roller system and have placed their order for rolls, etc., with Messrs. E. P. Allis & Co., Milwaukee, Wis.

Messrs. E. P. Allis & Co. have the order for all the special machinery including rolls, bolting chests, etc., for remodeling the mill of Messrs. Coons & Co., at Winchester, Ills.

Scott & Haskell, of Jacksonville, Ill., want to make as white flour as they can, and ordered a Becker Brush from the Eureka Mfg. Co., of Rock Falls, Ill., and it suits them.

Mr. A. Syme, the well known miller of Menasha, Wis., has ordered two pairs of porcelain and two pairs of iron rolls in Gray's Patent Belted Frames from E. P. Allis & Co.

M. W. Jarboe, of Carrolton, Mo., is putting up a first-class mill, and has just placed his order for an additional Becker Brush bought of the Eureka Mfg. Co, of Rock Falls, Ill.

Pyett & Evans are erecting a mill at Tahlequah, Ind., containing four-run of buhrs. The contract for machinery has been awarded Nordyke & Marmon Co, of Indianapolis, Ind.

Thurston & Sons will erect a new flouring mill containing the new improvements at Milo, Ia., in which machinery made by Nordyke & Marmon Co., of Indianapolis, Ind., will be used.

B. Savage & Son, of Forreston, Ill., have ordered a full line of reduction machines of the Case Mfg. Co., of Columbus, O., to be put in their new mill they are building in Nebraska.

Noel Mill & Elevator Co., of Nashville, Tenn., send draft for Becker Brush made by the Eureka Mfg. Co., of Rock Falls, Ill., and say well pleased, "it works beautifully nothing could do better."

John Marshall & Co. are commencing the erection of a three-run merchant mill at Sand Lake, Mich., in which machinery manufactured by Nordyke & Marmon Co., of Indianapolis, Ind., will be used.

M. & J. Pollock, of Wheeling, W. Va., are overhauling their mill, and have added a Becker Brush to their cleaning machinery, made by the Eureka Mfg. Co., of Rock Falls, Illinois.

Kentucky millers hear how the Becker Brush improves the color of their flour, and G. B. Louis, of Elkton, Ky., and many others have sent in their orders to the Eureka Mfg. Co., of Rock Falls, Ill., for machines.

Loreg & Weber, of La Porte, Ind., are putting in two pairs of double rolls, made by the Case Mfg. Co., of Columbus, O., preparation for following up with the rest of the Case Gradual Reduction System being made.

Messrs. Hoover & Weimer, West Milton, O., seeing the excellent work done by the Case Breaks and Rolls in the mill of Jos. Gebhard & Son, Dayton, have ordered a set for their mill, and the machines are now being put in.

New flouring mills are being built in West Virginia at the following places: Philippi, Weston, Flamington and Hampton. The machinery for all these mills is being furnished by Nordyke & Marmon Co., of Indianapolis, Ind.

In remodelling their mill, the Independence, Iowa, Mill Company will use ten pairs of Allis' Rolls including a double porcelain roller mill, all in Gray's Patent Noiseless Belted Frames. E. P. Allis & Co. are furnishing this machinery.

Messrs. E. P. Allis & Co. have the contract for remodelling the mill of Messrs. Hinman & Ward, Battle Creek, Mich., making it a complete roller mill. Messrs. E. P. Allis & Co. furnish a full line of iron and porcelain rolls, purifiers, bolt chests, etc.

E. P. Allis & Co. are rebuilding Stratton, Merrill & Co.'s mill at Fisherville, N. H., near Concord. The mill, when completed, will be of 250 barrels daily capacity, and will use twenty-four pairs of Allis' Rolls in Gray's Patent Noiseless Frames.

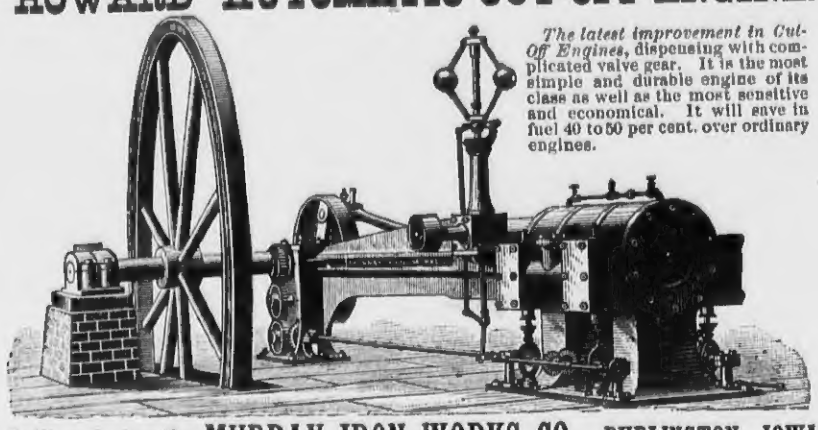
E. E. Wisner, of Lowell, Mich., who is putting in a full line of the Case Mfg Co.'s Breaks and Rolls, will have his mill running in about ten days more. This is very rapid work. The machinery was furnished promptly, and the change made in an unusually short space of time.

Messrs. Huntington & Koch. of Barton, Wis., have introduced the Case Break Roller System into their mills and are highly pleased with the results obtained. They think that the Case System cannot be beaten by any other. The local paper in speaking of the innovation, is very enthusiastic and claims as great a yield with as good a quality, as is obtained in the best Milwaukee and Minneapolis mills.

Mr S. Lightcap, of Hazel Green, Wis., who has been milling in Wisconsin for nearly forty years, visited Milwaukee one day recently and left his order with Edw. P. Allis & Co. for a full line of the Gray's Combined Roller and separating machines and Gray's Belted Roller Mills. He is about to remodel his mill to the complete roller system, and wisely placed his order with the firm which has had by far the most extensive experience in building roller mills.

The following well known millers East and West, after hearing of the merits of the Galt Combined Brush and Smutter, made by the Eureka Mfg. Co., of Rock Falls, Ill., have sent in their orders for machines to be shipped at once: David Russel, Sweedsboro, N. J.; Webster Bros., Freeport, Ill.; J. O. Allen & Co., Fayette, Ohio; Wm. Wollkamper, Turner, Neb.; G. W. Staley, Centreville, Ill.; F. H. Gilliam & Co., Gilliam, Mo.; Wm. Crouch, St. Edward, Neb.; B. B. Boardman, Clifton Springs, N. Y.; Abram Bristline, Andersonburg, Pa.; J. B. Kuykendall, Vienna, Ill.; A. F. Straw, Straw's Mills, Texas; C. T. Dodge. Lapeer, Mich.

"HOWARD" AUTOMATIC CUT-OFF ENGINE.



The latest improvement in Cut-Off Engines, dispensing with complicated valve gear. It is the most simple and durable engine of its class as well as the most sensitive and economical. It will save in fuel 40 to 50 per cent. over ordinary engines.

Built only by the **MURRAY IRON WORKS CO.**, BURLINGTON, IOWA,

BUILDERS OF ALL KINDS OF ENGINES AND MACHINERY.

Mention this Paper when you write to us.]

WANTED TO RENT WITH PRIVILEGE OF BUYING, a Water Power Mill in good condition and in a good wheat section. Wisconsin or Minnesota preferred.
Address **O. K.**
Care of UNITED STATES MILLER,
Milwaukee, Wis.

DON'T BUILD A MILL until you write for Prices and Samples to the BODINE ROOFING COMPANY, MANSFIELD, OHIO.

HARRIS-CORLISS ENGINE.

—BUILT BY—

WM. A. HARRIS, Providence, R. I.

Built under their original patents until their expiration. Improvements since added: "STOP MOTION ON REGULATOR," prevents engine from running away; "SELF-PACKING VALVE STEMS" (two patents), dispenses with four stuffing boxes; "RECESSED VALVE SEATS" prevent the wearing of shoulders on seats, and remedying a troublesome defect in other Corliss Engines, "BABBITT & HARRIS' PISTON PACKING" (two patents). "DRIP COLLECTING DEVICES" (one patent). Also in "General Construction" and "Superior Workmanship."

The BEST and MOST WORKMANLIKE form of the Corliss Engine now in the market, substantially built, of the best materials, and in both Condensing and Non-Condensing forms.

The Condensing Engine will save from 25 to 35 per cent. of fuel, or add a like amount to the power and consume no more fuel. Small parts are made in quantities and inter-changeable, and kept in stock, for the convenience of repairs and to be placed on new work ord red at short notice.

NO OTHER engine builder has authority to state that he can furnish this engine

The ONLY WORKS where this engine can be obtained are at PROVIDENCE, R. I., no outside parties being licensed.

WM. A. HARRIS, Proprietor.

[Mention this paper when you write to us.]

COCKLE SEPARATOR MANUFACTURING COMPANY, MILWAUKEE.

GENERAL MILL FURNISHERS

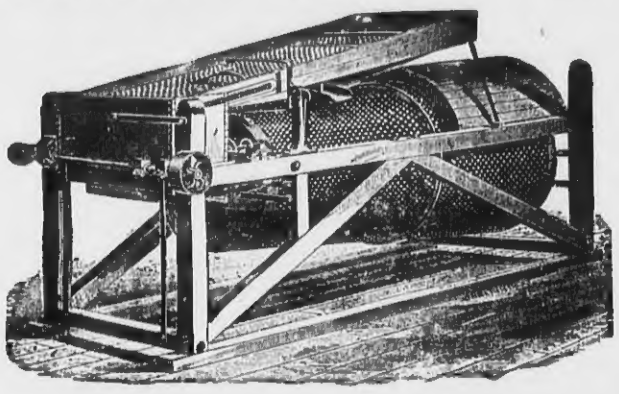
AND MANUFACTURERS OF

IMPROVED COCKLE SEPARATORS

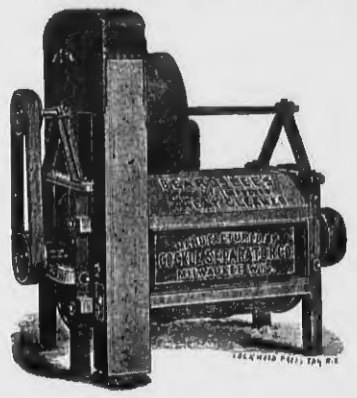
(Kurth's Patent,) Also built in combination with

Richardson's Dustless Wheat Separators!

Also Sole Manufacturer of BEARDSLEE'S PAT. GRAIN CLEANER.



PLAIN COCKLE MACHINE.



BEARDSLEE'S WHEAT CLEANER.

☛ We will contract to furnish entire Wheat Cleaning Machinery for mills, and guarantee the best results.

Send for Illustrated Catalogue.

Perforated Zinc at Bottom Figures.

WE GUARANTEE GREAT CAPACITY combined with GOOD QUALITY OF WORK. Any common Sieve will separate the cockle from wheat, but to separate it WITHOUT WASTE is the GREATEST FEATURE of our Machine. A WASTEFUL machine is a DAILY LOSS OF MONEY in a mill. There is NO MACHINE IN THE MARKET which can stand comparison with ours.

Carbondale, Ill., Dec. 2, 1881.
Cockle Separator Mfg. Co., Milwaukee.
Gentlemen:—Replying to your late favor, would say that we can cheerfully recommend your Cockle Separator as doing all that you claim for it. We have tested ours throughly by this time and know whereof we speak. We would not think of doing without it, having tried it once, and can conscientiously vouch for its good work.
Yours respectfully,
BROWN & WINFREY.

Perrysville, Ind., Nov. 24, 1881.
Cockle Separator Mfg. Co., Milwaukee.
Sirs:—The combined machine I bought of you has been running about three weeks. It certainly does all you claim for it, and is the most perfect Separator that I have any knowledge of.
Yours respectfully,
B. O. CARPENTER.

Hixton, Jackson Co., Wis., Dec. 30, '81
Cockle Separator Mfg. Co., Milwaukee.
Gents:—In answer to your inquiry of the 28th inst., I would say that the combined machine I bought of you last summer, works to my entire satisfaction.
Respectfully yours,
W. T. PRICE,
per D. G. THOMAS.

P. S.—I have been milling now for twenty-seven years, but never have I seen anything that will equal yours in cleaning wheat.

As an Oat Separator it is No. 1, and for Cockle it cannot be beat. I can take screenings and separate the cockle from it without wasting any of the small wheat. In my opinion every mill in the United States ought to have one, and if I were to build a mill I would have no other. I remain
Yours, etc. D. G. THOMAS.

Minneapolis, Minn. Aug. 22, 1881.
Cockle Separator Mfg. Co.:
We have been using two of Beardslees's wheat cleaners, a scourer and finisher, for nearly two years, and are passing one hundred and fifty bushels per hour through them, one third more than rated capacity, and are not using any other cleaners, and consider our wheat as well cleaned as any in Minneapolis.
Yours truly,
CAHILL, FLETCHER & CO.

La Crosse, Wis., July 30, 1881.
Cockle Separator Mfg. Co., Milwaukee.
Gentlemen:—The Beardslee Grain Cleaner sent me about the middle of June has been in operation since that time with very satisfactory results. We cannot see that it breaks the wheat or requires an unusual amount of power to run it.
Yours truly,
WILLIAM LISTMAN.

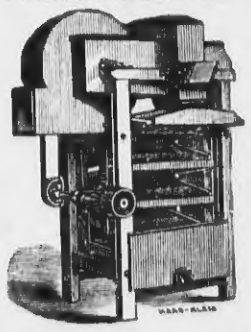
Milwaukee, Wis., Aug. 23, 1881.
Cockle Separator Mfg. Co.
Gentlemen:—The Beardslee's Grain Cleaners which we have purchased from you for our New Era and Milwaukee Mills give us the best of satisfaction. Experienced millers having seen the work done by the machine agree with us, that it cannot be beat. You are at liberty to use our names as a reference, and to any party calling on us we will be pleased to show the machine in operation,
Yours truly,
NEW ERA MILLING CO.

Pott's Patent Automatic Feeder! The best device for regulating the FEED ON ROLLER MILLS, PURIFIERS, and other machines requiring a regular feed, spread out the full width. Very cheap and simple. Sent on trial upon application. Write for circulars with illustrations. Perforated Zinc of all sizes at low rates. Send for Illustrated Catalogue.

HOWES, BABCOCK & EWELL,

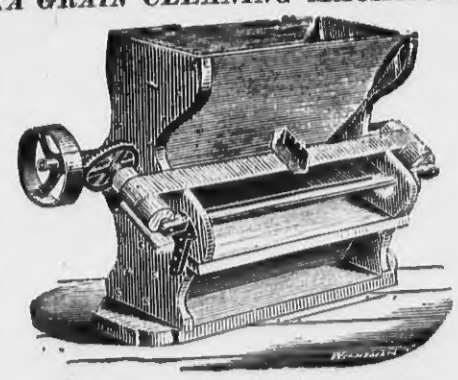
Established 1856. **Silver Creek, Chautauqua County, New York, U. S. A.** Established 1856.

MANUFACTURERS OF THE WORLD-RENOWNED EUREKA GRAIN CLEANING MACHINERY AND SPECIALTIES HEREWITH ILLUSTRATED

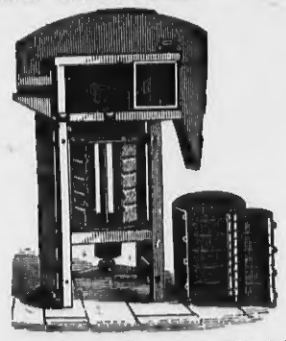


The Eureka Separator
occupies but little space, does its work in an effectual manner. *Is also built for use in Elevators and Warehouses, with a capacity of from 100 to 1,000 bushels per hour.*

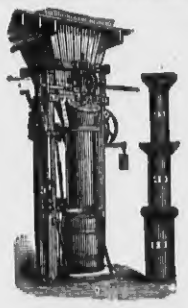
The Eureka Smut and Separating Machine,
A combined Smut and Separating Machine, having thorough ventilation. *Over 14,000 of these Machines are now in use.*



Eureka Magnetic Automatic Separator.
Removes all metallic particles from a flowing stream of grain, requiring no attention from the miller. *5 sizes.*



Eureka Brush Finishing Machine
Recognized as the leading one of this class of machines. Universally recommended for finishing the process of cleaning.



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Will pack whole and half barrels, and half, quarter, eighth and sixteenth barrel sacks. Provided with labor-saving patent creveling steel coil spring regulating the packing to perfection.

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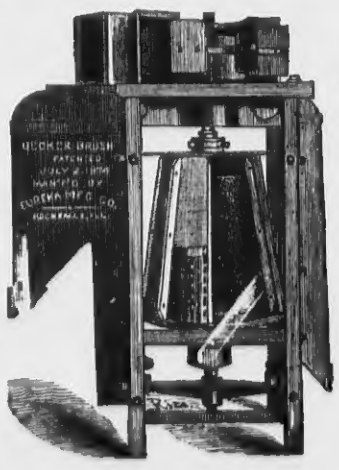

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Manufacturers and Sole Proprietors of the

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—AND—

Galt's Combined Smut and Brush Machine.

The Only Practical Cone-Shaped Machines in the Market, and for that Reason the Best.

ADJUSTABLE WHILE IN MOTION.

Nearly 1,000 of these Machines in Use.

In the United States and foreign countries, and so far as we know all that use them are pleased. Millers, millwrights, and milling experts claim the Cone Shape Solid Cylinder Brush is the true principle to properly clean grain. All machines sent on trial, the users to be the judges of the work. For price and terms apply to

EUREKA MANF'G CO., ROCK FALLS, ILL., U. S. A.

[Mention this paper when you write.]